

## **APPENDIX A**

### **Residential Sector**

**APPENDIX A-1**

**Single-Family Assumptions**

**Table A-1**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector (Single-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
1	Single-Family	Refrigerator Turn-in	303,067	Buyback	Per refrigerator	Per refrigerator	\$50.00	\$92.53	\$142.53	0	6.5	1383.00	413.00	0.00	\$28.94	\$0.0701	0	Refrigerator	1	13.0%
2	Single-Family	Freezer Turn-in	303,067	Buyback	Per freezer	Per freezer	\$50.00	\$92.53	\$142.53	0	5.5	1181.00	450.00	0.00	\$33.02	\$0.0734	0	Freezer	1	2.0%
3	Single-Family	Room AC Turn-in without Replacement	303,067	Buyback	Per Room AC	Per Room AC	\$25.00	\$117.53	\$142.53	0	6	191.00	40.00	0.00	\$30.81	\$0.7702	0	Room AC	1	36.0%
4	Single-Family	Room AC Turn-in with ES Replacement	303,067	Buyback	Per Room AC	Per Room AC	\$35.00	\$107.53	\$142.53	0	6	53.00	14.00	0.00	\$30.81	\$2.2006	0	Room AC	1	36.0%
5	Single-Family	Energy Star Single Room Air Conditioner	303,067	Market Driven	Per air conditioner	Per air conditioner	\$30.00	\$0.00	\$30.00	0	12	469.00	44	0.00	\$3.98	\$0.0904	0	Room AC	2	36.0%
6	Single-Family	Energy Star Compliant Top Freezer Refrigerator	303,067	Market Driven	Per refrigerator	Per refrigerator	\$30.00	\$0.00	\$30.00	0	13	532.00	80	0.00	\$3.79	\$0.0474	0	Refrigerator	2	65.8%
7	Single-Family	Energy Star Compliant Bottom Mount Freezer Refrigerator	303,067	Market Driven	Per refrigerator	Per refrigerator	\$30.00	\$0.00	\$30.00	0	13	579.00	87	0.00	\$3.79	\$0.0436	0	Refrigerator	2	8.2%

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Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
1	Single-Family	Refrigerator Turn-in	27.00%	73.0%	100%	84.5%	All homes in Vermont with second refrigerators	33,292	24,303	10,037,178	1,764	1,764	7,287,266	29.86%	0	0	\$0.00
2	Single-Family	Freezer Turn-in	33.00%	67.0%	100%	84.5%	All homes in Vermont with second freezers	5,122	3,432	1,544,232	241	241	1,083,268	38.10%	0	0	\$0.00
3	Single-Family	Room AC Turn-in without Replacement	60.20%	39.8%	100%	84.5%	All homes in Vermont with old room air conditioners.	92,193	36,693	1,467,712	1,825	1,825	730,168	20.94%	0	0	\$0.00
4	Single-Family	Room AC Turn-in with ES Replacement	60.20%	39.8%	100%	84.5%	All homes in Vermont with old room air conditioners.	92,193	36,693	513,699	1,825	1,825	255,559	26.42%	0	0	\$0.00
5	Single-Family	Energy Star Single Room Air Conditioner	32.00%	68%	100%	84.5%	Homes in service area with one or more window A/C units	92,193	62,691	2,758,414	3,688	3,688	1,622,596	9.38%	0	0	\$0.00
6	Single-Family	Energy Star Compliant Top Freezer Refrigerator	11.00%	89%	100%	84.5%	Homes in service area	168,611	150,064	12,005,083	8,949	8,949	7,159,471	15.04%	0	0	\$0.00
7	Single-Family	Energy Star Compliant Bottom Mount Freezer Refrigerator	11.00%	89%	100%	84.5%	Homes in service area	21,025	18,712	1,627,975	1,116	1,116	970,875	15.03%	0	0	\$0.00

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Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
8	Single-Family	Energy Star Compliant Side-by-Side Refrigerator	303,067	Market Driven	Per refrigerator	Per refrigerator	\$30.00	\$0.00	\$30.00	0	13	639.00	95	0.00	\$3.79	\$0.0399	0	Refrigerator	2	26.0%
9	Single-Family	Energy Star Compliant Upright Freezer (Manual Defrost)	303,067	Market Driven	Per freezer	Per freezer	\$33.00	\$0.00	\$33.00	0	11	546.00	55	0.00	\$4.62	\$0.0839	0	Freezer	2	22.4%
10	Single-Family	Energy Star Compliant Chest Freezer	303,067	Market Driven	Per freezer	Per freezer	\$33.00	\$0.00	\$33.00	0	11	520.00	52	0.00	\$4.62	\$0.0888	0	Freezer	2	19.9%
11	Single-Family	Energy Star Built-In Dishwasher (Electric)	303,067	Market Driven	Per dishwasher	Per dishwasher	\$50.00	\$0.00	\$50.00	0	10	413.00	72	0.00	\$7.44	\$0.1034	860	Dishwasher	2	57.0%
12	Single-Family	Energy Star Clothes Washers with Electric Water Heater	303,067	Market Driven	Per clothes washer	Per clothes washer	\$300.00	\$0.00	\$300.00	0	11	529.00	108	0.00	\$41.97	\$0.3886	7056	Clothes Washer	2	32.0%
13	Single-Family	Energy Star Clothes Washers with Non-Electric Water Heater	303,067	Market Driven	Per clothes washer	Per clothes washer	\$300.00	\$0.00	\$300.00	0	11	529.00	29	1.20	\$41.97	\$1.4473	7056	Clothes Washer	2	61.3%
14	Single-Family	Energy Star Dehumidifier (40pt)	303,067	Market Driven	Per Home	Per Home	\$0.00	\$0.00	\$0.00	0	12	1902.00	173	0.00	\$0.00	\$0.0000	0	Dehumidifier	2	28.5%
15	Single-Family	Standby-Power	303,067	Market Driven	Per home	Per home	\$30.00	\$0.00	\$30.00	0	7	440.00	265	0.00	\$5.76	\$0.0217	0	Appliances	2	100.0%

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Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
8	Single-Family	Energy Star Compliant Side-by-Side Refrigerator	11.00%	89%	100%	84.5%	Homes in service area	66,456	59,146	5,618,836	3,527	3,527	3,350,905	14.87%	0	0	\$0.00
9	Single-Family	Energy Star Compliant Upright Freezer (Manual Defrost)	12.00%	88%	100%	84.5%	Homes in service area which contain a freezer	57,365	50,481	2,776,443	3,546	3,546	1,950,394	10.07%	0	0	\$0.00
10	Single-Family	Energy Star Compliant Chest Freezer	12.00%	88%	100%	84.5%	Homes in service area which contain a freezer	50,962	44,847	2,332,032	3,150	3,150	1,638,204	10.00%	0	0	\$0.00
11	Single-Family	Energy Star Built-In Dishwasher (Electric)	21.00%	79%	100%	84.5%	Homes in Vermont with a dishwasher	145,972	115,318	8,302,900	8,612	8,612	6,200,900	17.43%	7,406,630	0	\$0.00
12	Single-Family	Energy Star Clothes Washers with Electric Water Heater	14.00%	86%	100%	84.5%	Homes in service area with an electric water heater and an electric clothes dryer	81,949	70,476	7,611,453	4,917	4,917	5,310,316	20.42%	34,694,063	0	\$0.00
13	Single-Family	Energy Star Clothes Washers with Non-Electric Water Heater	14.00%	86%	100%	84.5%	Homes in service area with a non-electric water heater and an electric clothes dryer	156,984	135,006	3,915,185	9,419	9,419	2,731,524	5.48%	66,460,814	113,029	\$0.00
14	Single-Family	Energy Star Dehumidifier (40pt)	2.50%	98%	100%	84.5%	Homes in service area with a dehumidifier	72,986	71,161	12,310,932	4,714	4,714	8,154,677	9.10%	0	0	\$0.00
15	Single-Family	Standby-Power	15.00%	85%	100%	84.5%	Homes in service area with small appliances	256,092	217,678	57,684,636	16,646	16,646	30,878,246	60.23%	0	0	\$0.00

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16	Single-Family	Pool Pump & Motor	303,067	Market Driven	Per Home	Per Home	\$313.00	\$0.00	\$313.00	0	15	1588.00	635	0.00	\$36.51	\$0.0575	0	Pool	2	11.6%
17	Single-Family	Energy Star Compliant Programmable Thermostat	303,067	Retrofit	Per home	Per home	\$50.00	\$0.00	\$50.00	0	10	778.00	296	0.00	\$7.44	\$0.0251	0	Central AC	1	4.2%
18	Single-Family	High Efficiency Central AC	303,067	Market Driven	Per home	Per home	\$379.00	\$0.00	\$379.00	0	18	-	311.5	0.00	\$40.37	\$0.1296	0	Central AC	2	4.2%
19	Single-Family	CFL's: Homes with partial CFL installation	5,299,323	Market Driven	Per fixture	Per fixture	\$5.00	\$0.00	\$5.00	0	12.08	72.57	25.97	0.00	\$0.00	\$0.0000	0	Lighting	2	100.0%
20	Single-Family	CFL's: Homes without CFL installation	3,944,220	Market Driven	Per fixture	Per fixture	\$5.00	\$0.00	\$5.00	0	10.872	72.57	31.164	0.00	\$0.00	\$0.0000	0	Lighting	2	100.0%
21	Single-Family	Water Heater Blanket	303,067	Retrofit	Per water heater	Per water heater	\$35.00	\$0.00	\$35.00	1	7	-	250	0.00	\$6.72	\$0.0269	0	Water Heating	1	36.9%
22	Single-Family	Low Flow Shower Head	303,067	Retrofit	Per shower head	Per shower head	\$15.00	\$0.00	\$15.00	1	9	-	340	0.00	\$2.40	\$0.0071	3440.8	Water Heating	1	36.9%

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16	Single-Family	Pool Pump & Motor	1.00%	99%	100%	84.5%	Homes in service territory with a pool	29,809	29,511	18,739,468	1,570	1,570	9,969,145	39.99%	0	0	\$0.00
17	Single-Family	Energy Star Compliant Programmable Thermostat	11.00%	89%	100%	84.5%	Homes in service area with central air conditioning and or electric space heat	10,679	9,504	2,813,281	737	737	2,181,083	38.05%	0	0	\$0.00
18	Single-Family	High Efficiency Central AC	24.00%	76%	100%	84.5%	Homes in service area with central air conditioning and or electric space heat	10,679	8,116	2,528,151	332	332	1,034,916	#VALUE!	0	0	\$0.00
19	Single-Family	CFL's: Homes with partial CFL installation	19.34%	81%	100%	84.5%	Homes with partial CFL installation (57.3% of homes)	4,477,928	3,611,897	93,800,965	224,860	224,860	58,396,197	35.79%	0	0	\$5.00
20	Single-Family	CFL's: Homes without CFL installation	0.00%	100%	100%	84.5%	Homes without CFL installation (42.7% of homes)	3,332,866	3,332,866	103,865,433	245,244	245,244	76,427,839	42.94%	0	0	\$5.00
21	Single-Family	Water Heater Blanket	61.60%	38%	100%	84.5%	Homes in service territory with an electric water heater	94,447	36,267	9,066,872	1,738	1,738	4,344,543	#VALUE!	0	0	\$0.00
22	Single-Family	Low Flow Shower Head	58.60%	41%	100%	84.5%	Homes in service territory with an electric water heater	94,447	39,101	13,294,302	2,021	2,021	6,871,934	#VALUE!	6,954,397	0	\$0.00



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23	Single-Family	Pipe Wrap	303,067	Retrofit	Per home	Per home	\$15.00	\$0.00	\$15.00	1	13	-	33	0.00	\$1.90	\$0.0574	0	Water Heating	1	36.9%
24	Single-Family	Low Flow Faucet Aerator	303,067	Retrofit	Per Faucet Aerator	Per Faucet Aerator	\$6.00	\$0.00	\$6.00	1	9	-	57.00	0.00	\$0.96	\$0.02	1496	Water Heating	1	36.9%
25	Single-Family	Solar Water Heating	303,067	Retrofit	Per Home	Per Home	\$4,500.00	\$0.00	\$4,500.00	1	20	-	1665.00	0.00	\$457.48	\$0.27	0	Water Heating	1	36.9%
26	Single-Family	Efficient Water Heater	303,067	Market Driven	Per Home	Per home	\$90.00	\$0.00	\$90.00	0	13	-	326.00	0.00	\$11.37	\$0.03	0	Water Heating	2	36.9%
27	Single-Family	Efficient Furnace Fan Motor (Fuel Oil)	303,067	Market Driven	Per Home	Per Home	\$200.00	\$0.00	\$200.00	0	18	-	462	0.00	\$21.30	\$0.0461	0	Space Heating	2	17.8%
28	Single-Family	Efficient Furnace Fan Motor (Natural Gas)	303,067	Market Driven	Per Home	Per Home	\$200.00	\$0.00	\$200.00	0	18	-	462	0.00	\$21.30	\$0.0461	0	Space Heating	2	3.8%

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23	Single-Family	Pipe Wrap	60.00%	40%	100%	84.5%	Homes in service territory with an electric water heater	94,447	37,779	1,246,695	1,889	1,889	623,347	#VALUE!	0	0	\$0.00
24	Single-Family	Low Flow Faucet Aerator	58.60%	41%	100%	84.5%	Homes in service territory with an electric water heater	94,447	39,101	2,228,751	2,021	2,021	1,152,059	#VALUE!	3,023,651	0	\$0.00
25	Single-Family	Solar Water Heating	0.00%	100%	100%	84.5%	Homes in service territory with an electric water heater	94,447	94,447	157,253,568	944	944	15,725,357	#VALUE!	0	0	\$0.00
26	Single-Family	Efficient Water Heater	6.00%	94%	100%	84.5%	Homes in service territory with an electric water heater	94,498	88,828	28,957,908	5,379	5,379	17,535,885	#VALUE!	0	0	\$0.00
27	Single-Family	Efficient Furnace Fan Motor (Fuel Oil)	10.00%	90%	100%	84.5%	Homes in service territory with a fuel-oil space heater using a central forced air furnace	45,456	40,911	18,900,714	1,768	1,768	8,166,975	#VALUE!	0	0	\$0.00
28	Single-Family	Efficient Furnace Fan Motor (Natural Gas)	10.00%	90%	100%	84.5%	Homes in service territory with a natural gas space heater using a central forced air furnace	9,603	8,643	3,993,109	373	373	1,725,417	#VALUE!	0	0	\$0.00

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29	Single-Family	Efficient Furnace Fan Motor (Propane)	303,067	Market Driven	Per Home	Per Home	\$200.00	\$0.00	\$200.00	0	18	-	462	0.00	\$21.30	\$0.0461	0	Space Heating	2	5.1%
30	Single-Family	Energy Star Windows - Electric Heat and no AC	303,067	Retrofit	Per Home	Per Home	\$200.00	\$0.00	\$200.00	1	35	20000	5000.00	0.00	\$17.12	\$0.00	0	Space Heating	1	2.00%
31	Single-Family	Insulation and Weatherization - Electric Heat and no AC	216,996	Retrofit	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	1	20	20000	6000.00	0.00	\$203.33	\$0.03	0	Space Heating	1	2.00%
32	New Construction	Residential New Construction	2,948	Market Driven	Per Home	Per Home	\$997.51	\$0.00	\$997.51	1	18		1671.00	31.70	\$106.25	\$0.06	1331.44	Total Home Electric Use	1	100.0%
33	Single-Family (Low Income)	Insulation and Weatherization - Electric Heat and no AC	86,071	Retrofit	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	1	20	20000	6000.00	0.00	\$203.33	\$0.03	0	Space Heating	1	2.00%

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**Database of Energy Efficiency Measures - Residential Sector (Single-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
29	Single-Family	Efficient Furnace Fan Motor (Propane)	10.00%	90%	100%	84.5%	Homes in service territory with a propane space heater using a central forced air furnace	13,137	11,824	5,462,572	511	511	2,360,371	#VALUE!	0	0	\$0.00
30	Single-Family	Energy Star Windows - Electric Heat and no AC	60.00%	40%	100%	84.5%	Homes in service territory with windows with electric heat but no AC	5,122	2,049	10,243,665	102	102	5,121,832	25.00%	0	0	\$0.00
31	Single-Family	Insulation and Weatherization - Electric Heat and no AC	75.00%	25%	100%	84.5%	Homes in service territory with windows with electric heat but no AC	3,667	917	5,500,849	18	18	1,100,170	30.00%	0	0	\$0.00
32	New Construction	Residential New Construction	20.00%	80%	100%	100.0%	New Homes	2,948	2,948	49,261,080	n/a	n/a	26,108,372	#DIV/0!	20,802,951	495,293	\$0.00
33	Single-Family (Low Income)	Insulation and Weatherization - Electric Heat and no AC	39.03%	61%	100%	50.0%	Low Income Homes in service territory with windows with electric heat but no AC	861	525	3,148,649	35	35	2,115,797	30.00%	0	0	\$0.00

**Table A-2**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Single-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-Family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
34	Single-Family	Water Heating - Electric to Natural Gas (1 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$500.00	\$0.00	\$500.00	0	13	2400	2400	-12.22	\$63.17	\$0.03	0	Water Heating	2	0.1%
35	Single-Family	Water Heating - Electric to Natural Gas (2 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$500.00	\$0.00	\$500.00	0	13	3000	3000	-15.27	\$63.17	\$0.02	0	Water Heating	2	0.4%
36	Single-Family	Water Heating - Electric to Natural Gas (3 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$500.00	\$0.00	\$500.00	0	13	3600	3600	-18.33	\$63.17	\$0.02	0	Water Heating	2	0.9%
37	Single-Family	Water Heating - Electric to Natural Gas (4 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$500.00	\$0.00	\$500.00	0	13	4500	4500	-22.91	\$63.17	\$0.01	0	Water Heating	2	0.4%
38	Single-Family	Water Heating - Electric to Natural Gas (5 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$500.00	\$0.00	\$500.00	0	13	5400	5400	-27.49	\$63.17	\$0.01	0	Water Heating	2	0.1%
39	Single-Family	Water Heating - Electric to Fuel Oil (1 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$1,575.00	\$0.00	\$1,575.00	0	10	2400	2400	-11.26	\$234.46	\$0.10	0	Water Heating	2	0.7%
40	Single-Family	Water Heating - Electric to Fuel Oil (2 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$1,575.00	\$0.00	\$1,575.00	0	10	3000	3000	-14.08	\$234.46	\$0.08	0	Water Heating	2	3.7%
41	Single-Family	Water Heating - Electric to Fuel Oil (3 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$1,575.00	\$0.00	\$1,575.00	0	10	3600	3600	-16.89	\$234.46	\$0.07	0	Water Heating	2	9.0%

**Table A-2**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Single-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-Family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
34	Single-Family	Water Heating - Electric to Natural Gas (1 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	170	170	407,097	10	10	250,521	100.00%	0	-1,276	\$0.00
35	Single-Family	Water Heating - Electric to Natural Gas (2 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	941	941	2,823,594	58	58	1,737,597	100.00%	0	-8,844	\$0.00
36	Single-Family	Water Heating - Electric to Natural Gas (3 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	2,259	2,259	8,132,292	139	139	5,004,487	100.00%	0	-25,481	\$0.00
37	Single-Family	Water Heating - Electric to Natural Gas (4 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	1,045	1,045	4,701,030	64	64	2,892,941	100.00%	0	-14,728	\$0.00
38	Single-Family	Water Heating - Electric to Natural Gas (5 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	310	310	1,676,297	19	19	1,031,567	100.00%	0	-5,251	\$0.00
39	Single-Family	Water Heating - Electric to Fuel Oil (1 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	1,730	1,730	4,152,385	138	138	3,321,908	100.00%	0	-15,585	\$0.00
40	Single-Family	Water Heating - Electric to Fuel Oil (2 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	9,600	9,600	28,800,663	768	768	23,040,531	100.00%	0	-108,137	\$0.00
41	Single-Family	Water Heating - Electric to Fuel Oil (3 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	23,041	23,041	82,949,380	1,843	1,843	66,359,504	100.00%	0	-311,337	\$0.00

**Table A-2**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Single-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
42	Single-Family	Water Heating - Electric to Fuel Oil (4 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$1,575.00	\$0.00	\$1,575.00	0	10	4500	4500	-21.12	\$234.46	\$0.05	0	Water Heating	2	4.2%
43	Single-Family	Water Heating - Electric to Fuel Oil (5 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$1,575.00	\$0.00	\$1,575.00	0	10	5400	5400	-25.34	\$234.46	\$0.04	0	Water Heating	2	1.2%
44	Single-Family	Water Heating - Electric to Propane (1 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$800.00	\$0.00	\$800.00	0	13	2400	2400	-11.82	\$101.08	\$0.04	0	Water Heating	2	0.2%
45	Single-Family	Water Heating - Electric to Propane (2 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$800.00	\$0.00	\$800.00	0	13	3000	3000	-14.77	\$101.08	\$0.03	0	Water Heating	2	1.0%
46	Single-Family	Water Heating - Electric to Propane (3 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$800.00	\$0.00	\$800.00	0	13	3600	3600	-17.73	\$101.08	\$0.03	0	Water Heating	2	2.5%
47	Single-Family	Water Heating - Electric to Propane (4 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$800.00	\$0.00	\$800.00	0	13	4500	4500	-22.16	\$101.08	\$0.02	0	Water Heating	2	1.1%
48	Single-Family	Water Heating - Electric to Propane (5 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$800.00	\$0.00	\$800.00	0	13	5400	5400	-26.59	\$101.08	\$0.02	0	Water Heating	2	0.3%
49	Single-Family	Water Heating - Electric to Kerosene (1 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	0	15	2400	2400	-8.19	\$233.30	\$0.10	0	Water Heating	2	0.2%

**Table A-2**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Single-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
42	Single-Family	Water Heating - Electric to Fuel Oil (4 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	10,656	10,656	47,950,502	852	852	38,360,402	100.00%	0	-180,038	\$0.00
43	Single-Family	Water Heating - Electric to Fuel Oil (5 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	3,166	3,166	17,098,225	253	253	13,678,580	100.00%	0	-64,188	\$0.00
44	Single-Family	Water Heating - Electric to Propane (1 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	475	475	1,139,870	29	29	701,459	100.00%	0	-3,455	\$0.00
45	Single-Family	Water Heating - Electric to Propane (2 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	2,635	2,635	7,906,064	162	162	4,865,270	100.00%	0	-23,953	\$0.00
46	Single-Family	Water Heating - Electric to Propane (3 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	6,325	6,325	22,770,418	389	389	14,012,565	100.00%	0	-69,012	\$0.00
47	Single-Family	Water Heating - Electric to Propane (4 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	2,925	2,925	13,162,883	180	180	8,100,236	100.00%	0	-39,889	\$0.00
48	Single-Family	Water Heating - Electric to Propane (5 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	869	869	4,693,630	53	53	2,888,388	100.00%	0	-14,223	\$0.00
49	Single-Family	Water Heating - Electric to Kerosene (1 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	543	543	1,302,709	29	29	694,778	100.00%	0	-2,371	\$0.00



**Table A-2**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Single-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-Family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
50	Single-Family	Water Heating - Electric to Kerosene (2 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	0	15	3000	3000	-10.24	\$233.30	\$0.08	0	Water Heating	2	1.2%
51	Single-Family	Water Heating - Electric to Kerosene (3 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	0	15	3600	3600	-12.29	\$233.30	\$0.06	0	Water Heating	2	2.8%
52	Single-Family	Water Heating - Electric to Kerosene (4 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	0	15	4500	4500	-15.36	\$233.30	\$0.05	0	Water Heating	2	1.3%
53	Single-Family	Water Heating - Electric to Kerosene (5 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	0	15	5400	5400	-18.43	\$233.30	\$0.04	0	Water Heating	2	0.4%
54	Single-Family	Water Heater - Electric to Kerosene (Stand Alone)	303,067	Market Driven	Per Home	Per Home	\$1,880.00	\$0.00	\$1,880.00	0	10	3068.25	3068.25	-15.26	\$279.86	\$0.09	0	Water Heating	2	5.9%
55	Single-Family	Water Heater - Electric to Wood	303,067	Market Driven	Per Home	Per Home	\$1,320.00	\$0.00	\$1,320.00	0	10	3068.25	3068.25	-20.75	\$196.50	\$0.06	0	Water Heating	2	5.2%
56	Single-Family	Space Heating (Fuel Switching)	303,067	Retrofit	Per Home	Per Home	\$6,500.00	\$0.00	\$6,500.00	1	20	20000.00	20000	-85.33	\$660.81	\$0.0330	0	Space Heating	2	2.0%

**Table A-2**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Single-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-Family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
50	Single-Family	Water Heating - Electric to Kerosene (2 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	3,012	3,012	9,035,502	161	161	4,818,935	100.00%	0	-16,449	\$0.00
51	Single-Family	Water Heating - Electric to Kerosene (3 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	7,229	7,229	26,023,335	386	386	13,879,112	100.00%	0	-47,382	\$0.00
52	Single-Family	Water Heating - Electric to Kerosene (4 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	3,343	3,343	15,043,295	178	178	8,023,091	100.00%	0	-27,385	\$0.00
53	Single-Family	Water Heating - Electric to Kerosene (5 Bedroom)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	993	993	5,364,149	53	53	2,860,879	100.00%	0	-9,764	\$0.00
54	Single-Family	Water Heater - Electric to Kerosene (Stand Alone)	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	15,120	15,120	46,390,863	1,210	1,210	37,112,690	100.00%	0	-184,581	\$0.00
55	Single-Family	Water Heater - Electric to Wood	0.00%	100%	100%	84.50%	Homes in service territory with an electric water heater	13,230	13,230	40,592,005	1,058	1,058	32,473,604	100.00%	0	-219,613	\$0.00
56	Single-Family	Space Heating (Fuel Switching)	0.00%	100%	100%	84.50%	Homes in service territory with an electric space heater	5,122	5,122	102,436,646	205	205	40,974,658	100.00%	0	-174,808	\$100.00

**Table A-2**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Single-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
57	Single-Family	Dryer (Fuel Switching)	303,067	Retrofit	Per Home	Per Home	\$375.00	\$0.00	\$375.00	1	14	942.00	942	-3.38	\$45.42	\$0.0482	0	Space Heating	2	15.2%

**Table A-2**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Single-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
57	Single-Family	Dryer (Fuel Switching)	0.00%	100%	100%	84.50%	Homes in service territory with natural gas or propane space heating and an electric dryer	38,900	38,900	36,644,098	2,223	2,223	20,939,485	100.00%	0	-75,133	\$0.00

## **APPENDIX A-2**

### **Multi-Family Assumptions**

**Table A-3**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector (Multi-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
1	Multi-Family	Refrigerator Turn-in	303,067	Buyback	Per refrigerator	Per refrigerator	\$50.00	\$92.53	\$142.53	0	6.5	1383.00	413.00	0.00	\$28.94	\$0.0701	0	Refrigerator	1	13.0%
2	Multi-Family	Freezer Turn-in	303,067	Buyback	Per freezer	Per freezer	\$50.00	\$92.53	\$142.53	0	5.5	1181.00	450.00	0.00	\$33.02	\$0.0734	0	Freezer	1	2.0%
3	Multi-Family	Room AC Turn-in without Replacement	303,067	Buyback	Per Room AC	Per Room AC	\$25.00	\$117.53	\$142.53	0	6	191.00	40.00	0.00	\$30.81	\$0.7702	0	Room AC	1	36.0%
4	Multi-Family	Room AC Turn-in with ES Replacement	303,067	Buyback	Per Room AC	Per Room AC	\$35.00	\$107.53	\$142.53	0	6	53.00	14.00	0.00	\$30.81	\$2.2006	0	Room AC	1	36.0%
5	Multi-Family	Energy Star Single Room Air Conditioner	303,067	Market Driven	Per air conditioner	Per air conditioner	\$30.00	\$0.00	\$30.00	0	12	469.00	44	0.00	\$3.98	\$0.0904	0	Room AC	2	36.0%
6	Multi-Family	Energy Star Compliant Top Freezer Refrigerator	303,067	Market Driven	Per refrigerator	Per refrigerator	\$30.00	\$0.00	\$30.00	0	13	532.00	80	0.00	\$3.79	\$0.0474	0	Refrigerator	2	65.8%
7	Multi-Family	Energy Star Compliant Bottom Mount Freezer Refrigerator	303,067	Market Driven	Per refrigerator	Per refrigerator	\$30.00	\$0.00	\$30.00	0	13	579.00	87	0.00	\$3.79	\$0.0436	0	Refrigerator	2	8.2%

**Table A-3**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector (Multi-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
1	Multi-Family	Refrigerator Turn-in	27.00%	73.0%	100%	15.5%	All homes in Vermont with second refrigerators	6,107	4,458	1,841,139	324	324	1,336,717	29.86%	0	0	\$0.00
2	Multi-Family	Freezer Turn-in	33.00%	67.0%	100%	15.5%	All homes in Vermont with second freezers	940	629	283,262	44	44	198,706	38.10%	0	0	\$0.00
3	Multi-Family	Room AC Turn-in without Replacement	60.20%	39.8%	100%	15.5%	All homes in Vermont with old room air conditioners.	16,911	6,731	269,225	335	335	133,936	20.94%	0	0	\$0.00
4	Multi-Family	Room AC Turn-in with ES Replacement	60.20%	39.8%	100%	15.5%	All homes in Vermont with room old air conditioners	16,911	6,731	94,229	335	335	46,878	26.42%	0	0	\$0.00
5	Multi-Family	Energy Star Single Room Air Conditioner	32.00%	68%	100%	15.5%	Homes in service area with one or more window A/C units	16,911	11,500	505,981	676	676	297,636	9.38%	0	0	\$0.00
6	Multi-Family	Energy Star Compliant Top Freezer Refrigerator	11.00%	89%	100%	15.5%	Homes in service area	30,929	27,526	2,202,116	1,642	1,642	1,313,276	15.04%	0	0	\$0.00
7	Multi-Family	Energy Star Compliant Bottom Mount Freezer Refrigerator	11.00%	89%	100%	15.5%	Homes in service area	3,857	3,432	298,623	205	205	178,090	15.03%	0	0	\$0.00

**Table A-3**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector (Multi-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
8	Multi-Family	Energy Star Compliant Side-by-Side Refrigerator	303,067	Market Driven	Per refrigerator	Per refrigerator	\$30.00	\$0.00	\$30.00	0	13	636.00	95	0.00	\$3.79	\$0.0399	0	Refrigerator	2	26.0%
9	Multi-Family	Energy Star Compliant Upright Freezer (Manual Defrost)	303,067	Market Driven	Per freezer	Per freezer	\$33.00	\$0.00	\$33.00	0	11	546.00	55	0.00	\$4.62	\$0.0839	0	Freezer	2	22.4%
10	Multi-Family	Energy Star Compliant Chest Freezer	303,067	Market Driven	Per freezer	Per freezer	\$33.00	\$0.00	\$33.00	0	11	520.00	52	0.00	\$4.62	\$0.0888	0	Freezer	2	19.9%
11	Multi-Family	Energy Star Built-In Dishwasher (Electric)	303,067	Market Driven	Per dishwasher	Per dishwasher	\$50.00	\$0.00	\$50.00	0	10	413.00	72	0.00	\$7.44	\$0.1034	860	Dishwasher	2	57.0%
12	Multi-Family	Energy Star Clothes Washers with Electric Water Heater	303,067	Market Driven	Per clothes washer	Per clothes washer	\$300.00	\$0.00	\$300.00	0	11	529.00	108	0.00	\$41.97	\$0.3886	7056	Clothes Washer	2	32.0%
13	Multi-Family	Energy Star Clothes Washers with Non-Electric Water Heater	303,067	Market Driven	Per clothes washer	Per clothes washer	\$300.00	\$0.00	\$300.00	0	11	529.00	29	1.20	\$41.97	\$1.4473	7056	Clothes Washer	2	61.3%
14	Multi-Family	Energy Star Dehumidifier (40pt)	303,067	Market Driven	Per Home	Per Home	\$0.00	\$0.00	\$0.00	0	12	1902.00	173	0.00	\$0.00	\$0.0000	0	Dehumidifier	2	28.5%
15	Multi-Family	Standby-Power	303,067	Market Driven	Per home	Per home	\$30.00	\$0.00	\$30.00	0	7	440.00	265	0.00	\$5.76	\$0.0217	0	Appliances	2	100.0%



**Table A-3**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector (Multi-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
8	Multi-Family	Energy Star Compliant Side-by-Side Refrigerator	11.00%	89%	100%	15.5%	Homes in service area	12,190	10,849	1,030,674	647	647	614,663	14.94%	0	0	\$0.00
9	Multi-Family	Energy Star Compliant Upright Freezer (Manual Defrost)	12.00%	88%	100%	15.5%	Homes in service area which contain a freezer	10,522	9,260	509,288	650	650	357,765	10.07%	0	0	\$0.00
10	Multi-Family	Energy Star Compliant Chest Freezer	12.00%	88%	100%	15.5%	Homes in service area which contain a freezer	9,348	8,226	427,769	578	578	300,499	10.00%	0	0	\$0.00
11	Multi-Family	Energy Star Built-In Dishwasher (Electric)	21.00%	79%	100%	15.5%	Homes in Vermont with a dishwasher	26,776	21,153	1,523,017	1,580	1,580	1,137,443	17.43%	1,358,613	0	\$0.00
12	Multi-Family	Energy Star Clothes Washers with Electric Water Heater	14.00%	86%	100%	15.5%	Homes in service area with an electric water heater and an electric clothes dryer	15,032	12,928	1,396,184	902	902	974,082	20.42%	6,364,000	0	\$0.00
13	Multi-Family	Energy Star Clothes Washers with Non-Electric Water Heater	14.00%	86%	100%	15.5%	Homes in service area with a non-electric water heater and an electric clothes dryer	28,796	24,764	718,170	1,728	1,728	501,049	5.48%	12,191,037	20,733	\$0.00
14	Multi-Family	Energy Star Dehumidifier (40pt)	2.50%	98%	100%	15.5%	Homes in service area with a dehumidifier	13,388	13,053	2,258,218	865	865	1,495,828	9.10%	0	0	\$0.00
15	Multi-Family	Standby-Power	15.00%	85%	100%	15.5%	Homes in service area with small appliances	46,975	39,929	10,581,205	3,053	3,053	5,664,057	60.23%	0	0	\$0.00

**Table A-3**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector (Multi-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
16	Multi-Family	Pool Pump & Motor	303,067	Market Driven	Per Home	Per Home	\$313.00	\$0.00	\$313.00	0	15	1588.00	635	0.00	\$36.51	\$0.0575	0	Pool	2	4.4%
17	Multi-Family	Energy Star Compliant Programmable Thermostat	303,067	Retrofit	Per home	Per home	\$50.00	\$0.00	\$50.00	0	10	778.00	296	0.00	\$7.44	\$0.0251	0	Central AC	1	4.2%
18	Multi-Family	High Efficiency Central AC	303,067	Market Driven	Per home	Per home	\$379.00	\$0.00	\$379.00	0	18	-	311.5	0.00	\$40.37	\$0.1296	0	Central AC	2	4.2%
19	Multi-Family	CFL's: Homes with partial CFL installation	5,299,323	Market Driven	Per fixture	Per fixture	\$5.00	\$0.00	\$5.00	0	12.08	72.57	25.97	0.00	\$0.00	\$0.0000	0	Lighting	2	100.0%
20	Multi-Family	CFL's: Homes without CFL installation	3,944,220	Market Driven	Per fixture	Per fixture	\$5.00	\$0.00	\$5.00	0	10.872	72.57	31.164	0.00	\$0.00	\$0.0000	0	Lighting	2	100.0%
21	Multi-Family	Water Heater Blanket	303,067	Retrofit	Per water heater	Per water heater	\$35.00	\$0.00	\$35.00	1	7	-	250	0.00	\$6.72	\$0.0269	0	Water Heating	1	41.6%
22	Multi-Family	Low Flow Shower Head	303,067	Retrofit	Per shower head	Per shower head	\$15.00	\$0.00	\$15.00	1	9	-	340	0.00	\$2.40	\$0.0071	3440.8	Water Heating	1	41.6%

**Table A-3**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector (Multi-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
16	Multi-Family	Pool Pump & Motor	1.00%	99%	100%	15.5%	Homes in service territory with a pool	2,067	2,046	1,299,367	109	109	691,246	39.99%	0	0	\$0.00
17	Multi-Family	Energy Star Compliant Programmable Thermostat	11.00%	89%	100%	15.5%	Homes in service area with central air conditioning and or electric space heat	1,959	1,743	516,046	135	135	400,080	38.05%	0	0	\$0.00
18	Multi-Family	High Efficiency Central AC	24.00%	76%	100%	15.5%	Homes in service area with central air conditioning and or electric space heat	1,959	1,489	463,744	61	61	189,837	#VALUE!	0	0	\$0.00
19	Multi-Family	CFL's: Homes with partial CFL installation	19.34%	81%	100%	15.5%	Homes with partial CFL installation (57.3% of homes)	821,395	662,537	17,206,094	41,247	41,247	10,711,728	35.79%	0	0	\$5.00
20	Multi-Family	CFL's: Homes without CFL installation	0.00%	100%	100%	15.5%	Homes without CFL installation (42.7% of homes)	611,354	611,354	19,052,239	44,986	44,986	14,019,308	42.94%	0	0	\$5.00
21	Multi-Family	Water Heater Blanket	61.60%	38%	100%	15.5%	Homes in service territory with an electric water heater	19,542	7,504	1,876,009	360	360	898,921	#VALUE!	0	0	\$0.00
22	Multi-Family	Low Flow Shower Head	58.60%	41%	100%	15.5%	Homes in service territory with an electric water heater	19,542	8,090	2,750,698	418	418	1,421,858	#VALUE!	1,438,921	0	\$0.00

**Table A-3**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector (Multi-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
23	Multi-Family	Pipe Wrap	303,067	Retrofit	Per home	Per home	\$15.00	\$0.00	\$15.00	1	13	-	33	0.00	\$1.90	\$0.0574	0	Water Heating	1	41.6%
24	Multi-Family	Low Flow Faucet Aerator	303,067	Retrofit	Per Faucet Aerator	Per Faucet Aerator	\$6.00	\$0.00	\$6.00	1	9	-	57.00	0.00	\$0.96	\$0.02	1496	Water Heating	1	41.6%
25	Multi-Family	Solar Water Heating	303,067	Retrofit	Per Home	Per Home	\$4,500.00	\$0.00	\$4,500.00	1	20	-	1665.00	0.00	\$457.48	\$0.27	0	Water Heating	1	41.6%
26	Multi-Family	Efficient Water Heater	303,067	Market Driven	Per Home	Per home	\$90.00	\$0.00	\$90.00	0	13	-	326.00	0.00	\$11.37	\$0.03	0	Water Heating	2	41.6%
27	Multi-Family	Efficient Furnace Fan Motor (Fuel Oil)	303,067	Market Driven	Per Home	Per Home	\$200.00	\$0.00	\$200.00	0	18	-	462	0.00	\$21.30	\$0.0461	0	Space Heating	2	11.1%
28	Multi-Family	Efficient Furnace Fan Motor (Natural Gas)	303,067	Market Driven	Per Home	Per Home	\$200.00	\$0.00	\$200.00	0	18	-	462	0.00	\$21.30	\$0.0461	0	Space Heating	2	10.0%
29	Multi-Family	Efficient Furnace Fan Motor (Propane)	303,067	Market Driven	Per Home	Per Home	\$200.00	\$0.00	\$200.00	0	18	-	462	0.00	\$21.30	\$0.0461	0	Space Heating	2	4.4%

**Table A-3**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector (Multi-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
23	Multi-Family	Pipe Wrap	60.00%	40%	100%	15.5%	Homes in service territory with an electric water heater	19,542	7,817	257,951	391	391	128,976	#VALUE!	0	0	\$0.00
24	Multi-Family	Low Flow Faucet Aerator	58.60%	41%	100%	15.5%	Homes in service territory with an electric water heater	19,542	8,090	461,146	418	418	238,370	#VALUE!	625,618	0	\$0.00
25	Multi-Family	Solar Water Heating	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	19,542	19,542	32,537,031	195	195	3,253,703	#VALUE!	0	0	\$0.00
26	Multi-Family	Efficient Water Heater	6.00%	94%	100%	15.5%	Homes in service territory with an electric water heater	19,542	18,369	5,988,377	1,112	1,112	3,626,349	#VALUE!	0	0	\$0.00
27	Multi-Family	Efficient Furnace Fan Motor (Fuel Oil)	10.00%	90%	100%	15.5%	Homes in service territory with a fuel-oil space heater using a central forced air furnace	5,219	4,697	2,170,046	203	203	937,674	#VALUE!	0	0	\$0.00
28	Multi-Family	Efficient Furnace Fan Motor (Natural Gas)	10.00%	90%	100%	15.5%	Homes in service territory with a natural gas space heater using a central forced air furnace	4,698	4,228	1,953,237	183	183	843,991	#VALUE!	0	0	\$0.00
29	Multi-Family	Efficient Furnace Fan Motor (Propane)	10.00%	90%	100%	15.5%	Homes in service territory with a propane space heater using a central forced air furnace	2,086	1,877	867,237	81	81	374,732	#VALUE!	0	0	\$0.00

**Table A-3**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector (Multi-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
30	Multi-Family	Energy Star Windows - Electric Heat and no AC	303,067	Retrofit	Per Home	Per Home	\$200.00	\$0.00	\$200.00	1	35	10000	2500.00	0.00	\$17.12	\$0.01	0	Space Heating	1	2.00%
31	Multi-Family	Insulation and Weatherization - Electric Heat and no AC	216,996	Retrofit	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	1	20	10000	3000.00	0.00	\$203.33	\$0.07	0	Space Heating	1	2.00%
33	Multi-Family (Low Income)	Insulation and Weatherization - Electric Heat and no AC	86,071	Retrofit	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	1	20	10000	3000.00	0.00	\$203.33	\$0.07		Space Heating	1	2.00%

**Table A-3**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector (Multi-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
30	Multi-Family	Energy Star Windows - Electric Heat and no AC	60.00%	40%	100%	15.5%	Homes in service territory with windows with electric heat but no AC	940	376	939,508	19	19	469,754	25.00%	0	0	\$0.00
31	Multi-Family	Insulation and Weatherization - Electric Heat and no AC	75.00%	25%	100%	15.5%	Homes in service territory with windows with electric heat but no AC	673	168	504,516	3	3	100,903	30.00%	0	0	\$0.00
33	Multi-Family (Low Income)	Insulation and Weatherization - Electric Heat and no AC	39.03%	61%	100%	50.0%	Low Income homes in service territory with windows with electric heat but no AC	861	525	1,574,325	35	35	1,057,899	30.00%	0	0	\$0.00

**Table A-4**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Multi-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
34	Multi-Family	Water Heating - Electric to Natural Gas (1 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$500.00	\$0.00	\$500.00	0	13	2400	2400	-12.22	\$63.17	\$0.03	0	Water Heating	2	0.5%
35	Multi-Family	Water Heating - Electric to Natural Gas (2 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$500.00	\$0.00	\$500.00	0	13	3000	3000	-15.27	\$63.17	\$0.02	0	Water Heating	2	0.8%
36	Multi-Family	Water Heating - Electric to Natural Gas (3 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$500.00	\$0.00	\$500.00	0	13	3600	3600	-18.33	\$63.17	\$0.02	0	Water Heating	2	0.6%
37	Multi-Family	Water Heating - Electric to Natural Gas (4 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$500.00	\$0.00	\$500.00	0	13	4500	4500	-22.91	\$63.17	\$0.01	0	Water Heating	2	0.1%
38	Multi-Family	Water Heating - Electric to Natural Gas (5 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$500.00	\$0.00	\$500.00	0	13	5400	5400	-27.49	\$63.17	\$0.01	0	Water Heating	2	0.0%
39	Multi-Family	Water Heating - Electric to Fuel Oil (1 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$1,575.00	\$0.00	\$1,575.00	0	10	2400	2400	-11.26	\$234.46	\$0.10	0	Water Heating	2	4.8%
40	Multi-Family	Water Heating - Electric to Fuel Oil (2 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$1,575.00	\$0.00	\$1,575.00	0	10	3000	3000	-14.08	\$234.46	\$0.08	0	Water Heating	2	8.4%
41	Multi-Family	Water Heating - Electric to Fuel Oil (3 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$1,575.00	\$0.00	\$1,575.00	0	10	3600	3600	-16.89	\$234.46	\$0.07	0	Water Heating	2	6.3%



**Table A-4**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Multi-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
34	Multi-Family	Water Heating - Electric to Natural Gas (1 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	222	222	533,021	14	14	328,013	100.00%	0	-1,670	\$0.00
35	Multi-Family	Water Heating - Electric to Natural Gas (2 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	389	389	1,165,764	24	24	717,393	100.00%	0	-3,652	\$0.00
36	Multi-Family	Water Heating - Electric to Natural Gas (3 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	289	289	1,039,426	18	18	639,647	100.00%	0	-3,257	\$0.00
37	Multi-Family	Water Heating - Electric to Natural Gas (4 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	67	67	299,868	4	4	184,534	100.00%	0	-939	\$0.00
38	Multi-Family	Water Heating - Electric to Natural Gas (5 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	11	11	60,150	1	1	37,015	100.00%	0	-188	\$0.00
39	Multi-Family	Water Heating - Electric to Fuel Oil (1 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	2,265	2,265	5,436,815	181	181	4,349,452	100.00%	0	-20,406	\$0.00
40	Multi-Family	Water Heating - Electric to Fuel Oil (2 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	3,964	3,964	11,890,790	317	317	9,512,632	100.00%	0	-44,646	\$0.00
41	Multi-Family	Water Heating - Electric to Fuel Oil (3 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	2,945	2,945	10,602,147	236	236	8,481,718	100.00%	0	-39,793	\$0.00

**Table A-4**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Multi-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
42	Multi-Family	Water Heating - Electric to Fuel Oil (4 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$1,575.00	\$0.00	\$1,575.00	0	10	4500	4500	-21.12	\$234.46	\$0.05	0	Water Heating	2	1.4%
43	Multi-Family	Water Heating - Electric to Fuel Oil (5 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$1,575.00	\$0.00	\$1,575.00	0	10	5400	5400	-25.34	\$234.46	\$0.04	0	Water Heating	2	0.2%
44	Multi-Family	Water Heating - Electric to Propane (1 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$800.00	\$0.00	\$800.00	0	13	2400	2400	-11.82	\$101.08	\$0.04	0	Water Heating	2	1.3%
45	Multi-Family	Water Heating - Electric to Propane (2 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$800.00	\$0.00	\$800.00	0	13	3000	3000	-14.77	\$101.08	\$0.03	0	Water Heating	2	2.3%
46	Multi-Family	Water Heating - Electric to Propane (3 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$800.00	\$0.00	\$800.00	0	13	3600	3600	-17.73	\$101.08	\$0.03	0	Water Heating	2	1.7%
47	Multi-Family	Water Heating - Electric to Propane (4 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$800.00	\$0.00	\$800.00	0	13	4500	4500	-22.16	\$101.08	\$0.02	0	Water Heating	2	0.4%
48	Multi-Family	Water Heating - Electric to Propane (5 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$800.00	\$0.00	\$800.00	0	13	5400	5400	-26.59	\$101.08	\$0.02	0	Water Heating	2	0.1%
49	Multi-Family	Water Heating - Electric to Kerosene (1 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	0	15	2400	2400	-8.19	\$233.30	\$0.10	0	Water Heating	2	1.5%

**Table A-4**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Multi-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
42	Multi-Family	Water Heating - Electric to Fuel Oil (4 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	680	680	3,058,657	54	54	2,446,925	100.00%	0	-11,484	\$0.00
43	Multi-Family	Water Heating - Electric to Fuel Oil (5 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	114	114	613,525	9	9	490,820	100.00%	0	-2,303	\$0.00
44	Multi-Family	Water Heating - Electric to Propane (1 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	622	622	1,492,459	38	38	918,436	100.00%	0	-4,523	\$0.00
45	Multi-Family	Water Heating - Electric to Propane (2 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	1,088	1,088	3,264,138	67	67	2,008,701	100.00%	0	-9,890	\$0.00
46	Multi-Family	Water Heating - Electric to Propane (3 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	808	808	2,910,393	50	50	1,791,011	100.00%	0	-8,821	\$0.00
47	Multi-Family	Water Heating - Electric to Propane (4 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	187	187	839,631	11	11	516,696	100.00%	0	-2,544	\$0.00
48	Multi-Family	Water Heating - Electric to Propane (5 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	31	31	168,419	2	2	103,642	100.00%	0	-510	\$0.00
49	Multi-Family	Water Heating - Electric to Kerosene (1 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	711	711	1,705,667	38	38	909,689	100.00%	0	-3,104	\$0.00

**Table A-4**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Multi-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
50	Multi-Family	Water Heating - Electric to Kerosene (2 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	0	15	3000	3000	-10.24	\$233.30	\$0.08	0	Water Heating	2	2.6%
51	Multi-Family	Water Heating - Electric to Kerosene (3 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	0	15	3600	3600	-12.29	\$233.30	\$0.06	0	Water Heating	2	2.0%
52	Multi-Family	Water Heating - Electric to Kerosene (4 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	0	15	4500	4500	-15.36	\$233.30	\$0.05	0	Water Heating	2	0.5%
53	Multi-Family	Water Heating - Electric to Kerosene (5 Bedroom)	303,067	Market Driven	Per Home	Per Home	\$2,000.00	\$0.00	\$2,000.00	0	15	5400	5400	-18.43	\$233.30	\$0.04	0	Water Heating	2	0.1%
54	Multi-Family	Water Heater- Electric to Kerosene (Stand Alone)	303,067	Market Driven	Per Home	Per Home	\$1,880.00	\$0.00	\$1,880.00	0	10	2524.22	2524.22	-12.87	\$279.86	\$0.11	0	Water Heating	2	6.7%
55	Multi-Family	Water Heater - Electric to Wood	303,067	Market Driven	Per Home	Per Home	\$1,320.00	\$0.00	\$1,320.00	0	10	2524.22	2524.22	-17.48	\$196.50	\$0.08	0	Water Heating	2	5.8%
56	Multi-Family	Space Heating (Fuel Switching)	303,067	Retrofit	Per Home	Per Home	\$6,500.00	\$0.00	\$6,500.00	1	20	10000.00	10000	-42.66	\$660.81	\$0.0661	0	Space Heating	2	2.0%

**Table A-4**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Multi-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-Family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
50	Multi-Family	Water Heating - Electric to Kerosene (2 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	1,243	1,243	3,730,444	66	66	1,989,570	100.00%	0	-6,791	\$0.00
51	Multi-Family	Water Heating - Electric to Kerosene (3 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	924	924	3,326,164	49	49	1,773,954	100.00%	0	-6,056	\$0.00
52	Multi-Family	Water Heating - Electric to Kerosene (4 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	213	213	959,579	11	11	511,775	100.00%	0	-1,747	\$0.00
53	Multi-Family	Water Heating - Electric to Kerosene (5 Bedroom)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	36	36	192,479	2	2	102,655	100.00%	0	-350	\$0.00
54	Multi-Family	Water Heater-Electric to Kerosene (Stand Alone)	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	3,127	3,127	7,892,432	250	250	6,313,946	100.00%	0	-32,192	\$0.00
55	Multi-Family	Water Heater - Electric to Wood	0.00%	100%	100%	15.5%	Homes in service territory with an electric water heater	2,736	2,736	6,905,878	219	219	5,524,703	100.00%	0	-38,258	\$0.00
56	Multi-Family	Space Heating (Fuel Switching)	0.00%	100%	100%	15.5%	Homes in service territory with an electric space heater	940	940	9,395,077	38	38	3,758,031	100.00%	0	-16,033	\$100.00

**Table A-4**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Multi-Family)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15.00	16	17	18	19	20	21
Measure #	Single- or Multi-family	Measure Description	Total Number of Residential Households (SF and MF Homes)	Market Driven or Retrofit	Savings Units	Cost Units	Equipment Cost	Labor Cost	Total Installed Cost	Cost Type: Incremental = 0 Full = 1	Measure Life (yrs)	Base Case Equipment End Use Intensity (Annual kWh per appliance)	Annual kWh Savings Per Unit Installed	Estimated Annual MMBTU (Natural Gas) Savings Per Unit Installed	Annual Amortized Cost Per Unit	Levelized Cost Per kWh Saved	Annual Gallons of water saved	Electric End Use Affected	Implementation Type 1 = 1 Time 2 = ROB	End Use Saturation (Percentage of total homes that contain the electric end use or the measure)
57	Multi-Family	Dryer (Fuel Switching)	303,067	Retrofit	Per Home	Per Home	\$375.00	\$0.00	\$375.00	1	14	942.00	942	-3.38	\$45.42	\$0.0482	0	Space Heating	2	18.9%

**Table A-4**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching (Multi-Family)**

1	2	3	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Measure #	Single- or Multi-family	Measure Description	Base Case Factor (Fraction of the end use energy that is already energy efficient)	Remaining Factor (In how many homes can this be installed)	Convertibility Factor	Single-/Multi-Family Fraction	Type of home where applicable	Number of applicable homes in 2005 (before applying remaining factor and convertibility factor) <sup>1</sup>	Total Homes Remaining without measure (after applying remaining factor and convertibility factor)	Technical Potential-Total annual kWh savings potential in 2005 if 100% penetration attained "overnight"	Maximum Achievable Program Participants per year (80% penetration limit, and before application of convertibility factor) <sup>2</sup>	Maximum Achievable Program Participants per year (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Maximum Achievable kWh Savings by 2015 (80% penetration limit, and after application of convertibility factor) <sup>2</sup>	Savings Factor (Percentage reduction in electric energy consumption)	Total annual gallons of water savings potential in 2005	Annual Maximum Achievable Therm Savings Potential in 2015	On-going annual O&M cost (+) or savings (-)
57	Multi-Family	Dryer (Fuel Switching)	0.00%	100%	100%	15.5%	Homes in service territory with natural gas or propane space heating and an electric dryer	8,874	8,874	8,358,979	507	507	4,776,559	100.00%	0	-17,139	\$0.00

**APPENDIX A-3**

**Residential Data Sources**



**Table A-5**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector**

1	2	3	4	5	6	7
	Source for Incremental Cost	Source for Useful Life	Source for Base Case Equipment End Use Intensity	Source for MMBTU, Therm, kWh and Water savings	Source for Saturation of End Use	Source for Saturation of Energy Efficient Measure
Refrigerator Turn-in	N/A	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov). Divided useful life in half to reflect that participants are turning in old appliances and not new ones.	Gross savings kWh per unit. Impact, Process, and Market Study of the Connecticut Appliance Retirement Program: Overall Report. December 23, 2005. Nexus Market Research, Inc. & RLW Analytics, Inc. Page 3, Table ES.4	Net Savings kWh per unit after applying realization rate. Impact, Process, and Market Study of the Connecticut Appliance Retirement Program: Overall Report. December 23, 2005. Nexus Market Research, Inc. & RLW Analytics, Inc. Page 3, Table ES.4	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs - KEMA, Inc. December 2005. Page 4-5	Sum of 19% and 8%, 2nd refrigerators that are 0-4 years old. Page 4-8 Table 4-3 in the Phase 2 Evaluation of the Efficiency VT Residential Programs.
Freezer Turn-in	N/A	Savings Calculator-Residential Freezers (.xls), found on the EnergyStar website (www.energystar.gov). Divided useful life in half to reflect that participants are turning in old appliances and not new ones.	Gross savings kWh per unit. Impact, Process, and Market Study of the Connecticut Appliance Retirement Program: Overall Report. December 23, 2005. Nexus Market Research, Inc. & RLW Analytics, Inc. Page 3, Table ES.4	Net Savings kWh per unit after applying realization rate. Impact, Process, and Market Study of the Connecticut Appliance Retirement Program: Overall Report. December 23, 2005. Nexus Market Research, Inc. & RLW Analytics, Inc. Page 3, Table ES.4	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs - KEMA, Inc. December 2005. Page 4-5	2nd freezers that are 0-4 years old. Page 4-8 Table 4-4 in the Phase 2 Evaluation of the Efficiency VT Residential Programs.
Room AC Turn-in without Replacement	N/A	Savings Calculator-Room Air Conditioners (.xls), found on the EnergyStar website (www.energystar.gov). Divided useful life in half to reflect that participants are turning in old appliances and not new ones.	Gross savings kWh per unit. Impact, Process, and Market Study of the Connecticut Appliance Retirement Program: Overall Report. December 23, 2005. Nexus Market Research, Inc. & RLW Analytics, Inc. Page 3, Table ES.4	Net Savings kWh per unit after applying realization rate. Impact, Process, and Market Study of the Connecticut Appliance Retirement Program: Overall Report. December 23, 2005. Nexus Market Research, Inc. & RLW Analytics, Inc. Page 3, Table ES.4	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs. KEMA, Inc. December 2005. Page 3-12	GDS Calculation based on Vermont Residential Appliance Saturation Study. Room Air Conditioners that are 0-4 years old.
Room AC Turn-in with ES Replacement	N/A	Savings Calculator-Room Air Conditioners (.xls), found on the EnergyStar website (www.energystar.gov). Divided useful life in half to reflect that participants are turning in old appliances and not new ones.	Gross savings kWh per unit. Impact, Process, and Market Study of the Connecticut Appliance Retirement Program: Overall Report. December 23, 2005. Nexus Market Research, Inc. & RLW Analytics, Inc. Page 3, Table ES.4	Net Savings kWh per unit after applying realization rate. Impact, Process, and Market Study of the Connecticut Appliance Retirement Program: Overall Report. December 23, 2005. Nexus Market Research, Inc. & RLW Analytics, Inc. Page 3, Table ES.4	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs. KEMA, Inc. December 2005. Page 3-12	GDS Calculation based on Vermont Residential Appliance Saturation Study. Room Air Conditioners that are 0-4 years old.
Energy Star Single Room Air Conditioner	Savings Calculator-Room Air Conditioners (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Room Air Conditioners (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Room Air Conditioners (.xls), found on the EnergyStar website (www.energystar.gov). Burlington, VT specific.	Savings Calculator-Room Air Conditioners (.xls), found on the EnergyStar website (www.energystar.gov). Burlington, VT specific.	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs. KEMA, Inc. December 2005. Page 3-12	Email from Bill McNary of D&R Intl. Feb. 22, 2006
Energy Star Compliant Top Freezer Refrigerator	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	GDS Calculation based on Vermont Residential Appliance Saturation Study.	Email from Bill McNary of D&R Intl. Feb. 22, 2006
Energy Star Compliant Bottom Mount Freezer Refrigerator	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	GDS Calculation based on Vermont Residential Appliance Saturation Study.	Email from Bill McNary of D&R Intl. Feb. 22, 2006
Energy Star Compliant Side-by-Side Refrigerator	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website (www.energystar.gov)	GDS Calculation based on Vermont Residential Appliance Saturation Study.	Email from Bill McNary of D&R Intl. Feb. 22, 2006
Energy Star Compliant Upright Freezer (Manual Defrost)	Savings Calculator-Residential Freezers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Freezers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Freezers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Freezers (.xls), found on the EnergyStar website (www.energystar.gov)	GDS Calculation based on Vermont Residential Appliance Saturation Study.	Assumes an average market 20% market share of Energy Star Freezers for the last 10 years. Based on shipping reports from AHAM for 2002 and NGRID Report June 28, 2000 Energy Star Market Update, page 5 - average 1999 Energy Star Shipments = 21%.
Energy Star Compliant Chest Freezer	Savings Calculator-Residential Freezers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Freezers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Freezers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Freezers (.xls), found on the EnergyStar website (www.energystar.gov)	GDS Calculation based on Vermont Residential Appliance Saturation Study.	Assumes an average market 20% market share of Energy Star Freezers for the last 10 years. Based on shipping reports from AHAM for 2002 and NGRID Report June 28, 2000 Energy Star Market Update, page 5 - average 1999 Energy Star Shipments = 21%.
Energy Star Built-In Dishwasher (Electric)	Savings Calculator-Residential Dishwashers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Dishwashers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Dishwashers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Residential Dishwashers (.xls), found on the EnergyStar website (www.energystar.gov)	Final Report: Phase 2 Evaluation of the Efficiency VT Residential Programs. KEMA, Inc. December 2005. Page 3-23	Email from Bill McNary of D&R Intl. Feb. 22, 2006
Energy Star Clothes Washers with Electric Water Heater	Savings Calculator-Clothes Washers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Clothes Washers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Clothes Washers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Clothes Washers (.xls), found on the EnergyStar website (www.energystar.gov) & Efficiency Vermont Residential Master Technical Reference Manual. 2005-37. Page 92.	GDS Calculation based on Vermont Residential Appliance Saturation Study.	Email from Bill McNary of D&R Intl. Feb. 22, 2006

**Table A-5**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector**

1	2	3	4	5	6	7
	Source for Incremental Cost	Source for Useful Life	Source for Base Case Equipment End Use Intensity	Source for MMBTU, Therm, kWh and Water savings	Source for Saturation of End Use	Source for Saturation of Energy Efficient Measure
Energy Star Clothes Washers with Non-Electric Water Heater	Savings Calculator-Clothes Washers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Clothes Washers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Clothes Washers (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Clothes Washers (.xls), found on the EnergyStar website (www.energystar.gov)	GDS Calculation based on Vermont Residential Appliance Saturation Study.	Email from Bill McNary of D&R Intl. Feb. 22, 2006
Energy Star Dehumidifier (40pt)	Savings Calculator-Dehumidifier (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Dehumidifier (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Dehumidifier (.xls), found on the EnergyStar website (www.energystar.gov)	Savings Calculator-Dehumidifier (.xls), found on the EnergyStar website (www.energystar.gov)	GDS Calculation based on Vermont Residential Appliance Saturation Study.	Illinois Residential Market Analysis. MEEA. May 12, 2003. Pg 20
Standby-Power	Emerging Technologies & Practices: 2004, ACEEE. Page 41	Emerging Technologies & Practices: 2004, ACEEE. Page 41	Emerging Technologies & Practices: 2004, ACEEE. Page 41	Emerging Technologies & Practices: 2004, ACEEE. Page 41	All homes have small appliances	Email from Jennifer T. Amann (ACEEE). March 09, 2006.
Pool Pump and Motor	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	GDS Calculation based on Vermont Residential Appliance Saturation Study.	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates
Energy Star Compliant Programmable Thermostat	Dick Spellman's in store visit to Home Depot. 2005	Dick Spellman's phone call with Honeywell. 2001	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	"2002 DSM Performance Measurement Report" National Grid for the MA Department of Telecommunications and Energy. July 2003	GDS Calculation based on Vermont Residential Appliance Saturation Study. Includes customers that have electric heat, central AC or both.	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates
High Efficiency Central AC	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 492	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 492	-	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 491	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs. KEMA, Inc. December 2005. Page 3-11	GDS Calculation based on Vermont Residential Appliance Saturation Study.
CFL's (partial installation already present)	Jeffrey Huber's phone call with Home Depot - Williston, VT (#4501). Feb 15, 2006. Brought down calculated incremental cost of all bulbs by \$.69 based on multipack impacts.	Useful life of 7500 hours were taken from manufacturer data on product package and used to calculate useful life in years. Hour use of 3.4 hours/day came from the Impact Evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs on Oct. 1, 2004.	GDS Calculation based on Maine Residential Lighting Program data. 2003-2005	GDS Calculation based on Maine Residential Lighting Program data. 2003-2005	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs. KEMA, Inc. December 2005. Page 121	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs. KEMA, Inc. December 2005. Page 121
CFL's	Jeffrey Huber's phone call with Home Depot - Williston, VT (#4501). Feb 15, 2006. Brought down calculated incremental cost of all bulbs by \$.69 based on multipack impacts.	Useful life of 7500 hours were taken from manufacturer data on product package and used to calculate useful life in years. Hour use of 3.4 hours/day came from the Impact Evaluation of the Massachusetts, Rhode Island, and Vermont 2003 Residential Lighting Programs on Oct. 1, 2004.	GDS Calculation based on Maine Residential Lighting Program data. 2003-2005	GDS Calculation based on Maine Residential Lighting Program data. 2003-2005	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs. KEMA, Inc. December 2005. Page 121	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs. KEMA, Inc. December 2005. Page 121
Water Heater Blanket	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 368.	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 368.	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 367.	GDS Calculation based on Vermont Residential Appliance Saturation Study.	GDS Calculation based on Vermont Residential Appliance Saturation Study.
Low Flow Shower Head	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 380.	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 380.	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 379.	GDS Calculation based on Vermont Residential Appliance Saturation Study.	GDS Calculation based on Vermont Residential Appliance Saturation Study.
Pipe Wrap	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 372.	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 372.	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 371.	GDS Calculation based on Vermont Residential Appliance Saturation Study.	GDS Assumption based on saturation of similar measures.

**Table A-5**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector**

1	2	3	4	5	6	7
	Source for Incremental Cost	Source for Useful Life	Source for Base Case Equipment End Use Intensity	Source for MMBTU, Therm, kWh and Water savings	Source for Saturation of End Use	Source for Saturation of Energy Efficient Measure
Low Flow Faucet Aerator	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 383.	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 383.	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 382.	GDS Calculation based on Vermont Residential Appliance Saturation Study.	GDS Assumption extended from Low-Flow Showerhead Calculation based on Vermont Residential Appliance Saturation Study.
Solar Water Heating	Incremental Cost based on estimation given in "Supplemental Findings on GDS Draft Potential Study - Residential Sector" by Jim Plunkett.	Table 6-6 in "Consumer Guide to Home Energy Savings" 8th ed. ACEEE. 2003.	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates
Efficient Water Heater	Table 6-6 in "Consumer Guide to Home Energy Savings" 8th ed. ACEEE. 2003.	Table 6-6 in "Consumer Guide to Home Energy Savings" 8th ed. ACEEE. 2003.	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates	Energy calculations based on DOE Energy Efficiency and Renewable Energy assumptions of electric water heater energy costs. Found on DOE website (www.eere.energy.gov) on Feb. 27, 2006.	GDS Calculation based on Vermont Residential Appliance Saturation Study.	Table B-7 (Database of Energy Efficiency Measures) in Appendix B of "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region," June, 2004, by GDS Associates
Efficient Furnace Fan Motor (Fuel Oil)	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 552	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 552	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 550	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 552	GDS Calculation based on Vermont Residential Appliance Saturation Study. Based on # of homes with Fuel Oil space heating & central forced air furnace.	GDS Estimate
Efficient Furnace Fan Motor (Natural Gas)	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 552	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 552	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 550	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 552	GDS Calculation based on Vermont Residential Appliance Saturation Study. Based on # of homes with Nat. Gas space heating & central forced air furnace.	GDS Estimate
Efficient Furnace Fan Motor (Propane)	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 552	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 552	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 550	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 552	GDS Calculation based on Vermont Residential Appliance Saturation Study. Based on # of homes with propane space heating & central forced air furnace.	GDS Estimate
Energy Star Windows (SF & MF)	"Baseline Characterization of the Residential Market for Energy Star Windows in the Northeast." The study was prepared for NEEP by Quantec LLC and Nexus Market Research in October of 2002. Table V.10 on page V-11.	ACEEE report, "Selecting Targets for Market Transformation Programs, A National Analysis", August 1998, page 60. This data source was supplemented by phone interviews conducted of window manufacturers by GDS in February 2004.	GDS calculation based on figures derived from "Supplemental Findings on GDS Draft Potential Study-Residential Sector" comments by John Plunkett	GDS calculation based on figures derived from "Supplemental Findings on GDS Draft Potential Study-Residential Sector" comments by John Plunkett	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs. KEMA, Inc. December 2005. Page 3-33	GDS Calculation based on Vermont Residential Appliance Saturation Study.
Insulation and Weatherization (SF & MF)	GDS calculation based on program incentive figures from KeySpan Weatherization program completed in February 2006.	GDS calculation based on useful life of insulation/weatherization individual measures	GDS calculation based on figures derived from "Supplemental Findings on GDS Draft Potential Study-Residential Sector" comments by John Plunkett	GDS calculation based on figures derived from "Supplemental Findings on GDS Draft Potential Study-Residential Sector" comments by John Plunkett	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs. KEMA, Inc. December 2005. Page 3-33	GDS Assumption based on meeting with Efficiency Vermont and Vermont Department of Public Services
Residential New Construction	GDS calculation based off figures in the Efficiency Vermont 2004 Annual Report. November 2005. Page 49	Efficiency Vermont 2004 Annual Report. November 2005. Page 49	-	Electric: Efficiency Vermont 2004 Annual Report. November 2005. Page 49. Gas: Efficiency Vermont 2004 Annual Report. November 2005. Page 48 and Efficiency Vermont 2003 Annual Report. October 2004. Page 50.	The entire new home market is eligible for this program.	GDS Calculation based on Efficiency Vermont 2004 Annual Report Information. November 2005. Page 49. Took 2004 New Homes Construction Participants divided by the number of New Homes Constructed each year.
Low-Income Insulation and Weatherization (SF & MF)	GDS calculation based on program incentive figures from KeySpan Weatherization program completed in February 2006	GDS calculation based on useful life of insulation/weatherization individual measures	GDS calculation based on figures derived from "Supplemental Findings on GDS Draft Potential Study-Residential Sector" comments by John Plunkett	GDS calculation based on figures derived from "Supplemental Findings on GDS Draft Potential Study-Residential Sector" comments by John Plunkett	Final Report: Phase 2 Evaluation of the Efficiency Vermont Residential Programs. KEMA, Inc. December 2005. Page 3-33	GDS Calculation based on # of eligible homes for low income weatherization assistance (60% of state median income) and number of homes that have participated in program.

**Table A-6**  
**Vermont Electric Energy Efficiency Potential Study**  
**Database of Energy Efficiency Measures - Residential Sector Fuel-Switching**

1	2	3	4	5	6	7
	Source for Incremental Cost	Source for Useful Life	Source for Base Case Equipment End Use Intensity	Source for MMBTU, Therm, kWh and Water savings	Source for Saturation of End Use	Source for Saturation of Energy Efficient Measure
WH Fuel Switching (Electric to Natural Gas)	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 576	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 574	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577 & 579. (Stand Alone model)	GDS Calculation based on Vermont Residential Appliance Saturation Study. End use= % of homes with with electric water heaters * % of homes with # of bedroom * % of homes with specific fossil fuel source.	GDS Assumption that no homes in Vermont currently using electric water heating have already switched fuel sources.
WH Fuel Switching (Electric to Fuel Oil)	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 576	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 574	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577 & 579. (Stand Alone model)	GDS Calculation based on Vermont Residential Appliance Saturation Study. End use= % of homes with with electric water heaters * % of homes with # of bedroom * % of homes with specific fossil fuel source.	GDS Assumption that no homes in Vermont currently using electric water heating have already switched fuel sources.
WH Fuel Switching (Electric to Propane)	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 576	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 574	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577 & 579. (Stand Alone model)	GDS Calculation based on Vermont Residential Appliance Saturation Study. End use= % of homes with with electric water heaters * % of homes with # of bedroom * % of homes with specific fossil fuel source.	GDS Assumption that no homes in Vermont currently using electric water heating have already switched fuel sources.
WH Fuel Switching (Electric to Kerosene)	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 576	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 574	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577 & 579. (Stand Alone model)	GDS Calculation based on Vermont Residential Appliance Saturation Study. End use= % of homes with with electric water heaters * % of homes with # of bedroom * % of homes with specific fossil fuel source.	GDS Assumption that no homes in Vermont currently using electric water heating have already switched fuel sources.
WH Fuel Switching (Electric to Kerosene Stand Alone)	GDS Calculation based on list price of kerosene water heater models made by John Wood and Bradford-White. April 81, 2006.	GDS Estimate based on similar model assumptions	The residential water heating annual energy usage estimates were calculated an engineering end use computer model developed by Scott Pigg at the Energy Enter of Wisconsin. Data on the number of persons per household and house size were obtained from the VDPS 2005 Residential Appliance Saturation Survey.	The residential water heating annual energy usage estimates were calculated an engineering end use computer model developed by Scott Pigg at the Energy Enter of Wisconsin. Data on the number of persons per household and house size were obtained from the VDPS 2005 Residential Appliance Saturation Survey. Savings based on an electric water heater with an efficiency rating of .95 being switched to a kerosene water heater with an efficiency rating of .68	GDS Calculation based on Vermont Residential Appliance Saturation Study. End use= % of homes with with electric water heaters * % of homes with specific fossil fuel source.	GDS Assumption that no homes in Vermont currently using electric water heating have already switched fuel sources.
WH Fuel Switching (Electric to Wood)	GDS phone call with Black Stove Shop (ME) on March 28, 2006.	GDS Estimate based on similar model assumptions	The residential water heating annual energy usage estimates were calculated an engineering end use computer model developed by Scott Pigg at the Energy Enter of Wisconsin. Data on the number of persons per household and house size were obtained from the VDPS 2005 Residential Appliance Saturation Survey.	The residential water heating annual energy usage estimates were calculated an engineering end use computer model developed by Scott Pigg at the Energy Enter of Wisconsin. Data on the number of persons per household and house size were obtained from the VDPS 2005 Residential Appliance Saturation Survey. Savings based on an electric water heater with an efficiency rating of .95 being switched to a wood consuming water heater with an efficiency rating of .50	GDS Calculation based on Vermont Residential Appliance Saturation Study. End use= % of homes with with electric water heaters * % of homes with specific fossil fuel source.	GDS Assumption that no homes in Vermont currently using electric water heating have already switched fuel sources.
Space Heating Fuel Switching	2003 Optimal Energy Model Inputs.	GDS estimate based on known Space Heating measures.	Annual Consumption based on figures derived from "Supplemental Findings on GDS Draft Potential Study-Residential Sector" comments by John Plunkett	GDS calculation based on figures derived from "Supplemental Findings on GDS Draft Potential Study-Residential Sector" comments by John Plunkett	GDS Calculation based on Vermont Residential Appliance Saturation Study.	GDS Assumption that no homes in Vermont currently using electric space heating have already switched fuel sources.
Dryer Fuel Switching	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 36	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 37	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 36	Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 36	GDS Calculation based on Vermont Residential Appliance Saturation Study. SF & MF homes with electric clothes dryers and natural gas or propane space heating.	GDS Assumption that no homes in Vermont currently using electric dryers in natural gas space heated homes have already switched dryer fuel sources.

## **APPENDIX A-4**

### **Residential Energy Star Appliance Savings and Cost Comparison**

**Table A-7**  
**Vermont Electric Energy Efficiency Potential Study**  
**Comparison of Energy Star Appliance Savings (kWh) and Costs**

<b>Comparison of Energy Star Appliance Savings (kWh) and Costs</b>				
Measure	Savings (kWh)		Cost (\$)	
	Energy Star Savings Calculator	Efficiency Vermont Tech. Resource Manual <sup>(1)</sup>	Energy Star Savings Calculator	Efficiency Vermont Tech. Resource Manual <sup>(1)</sup>
Energy Star Refrigerator				
Top Freezer Refrigerator	80	85.5	\$30	\$30
Bottom Mount Freezer Refrigerator	87		\$30	
Side-by-Side Refrigerator	95		\$30	
Energy Star Freezer				
Upright Freezer	55	56.7	\$33	\$30
Chest Freezer	52		\$33	
Energy Star Dishwasher				
Built-In Dishwasher	72	68.6	\$50	\$27
Energy Star Clothes Washer				
Clothes Washer (Electric WH)	286*	108	\$300	\$270
Clothes Washer (Non-Electric WH)	29	23	\$300	\$270
Energy Star Room A/C				
Single Room Air Conditioner	44	39.6	\$30	\$40
Energy Star Dehumidifier				
Dehumidifier (40 pint)	173	n/a	\$0	n/a

\* Includes electric dryer savings.

1. Efficiency Vermont Residential Master Technical Reference Manual. 2005-37.

## **APPENDIX A-5**

### **Residential Single Family and Multi-Family Vermont Household Data (by Square Footage)**

**Table A-8**  
**Vermont Electric Energy Efficiency Potential Study**  
**Single Family and Multi Family Vermont Household Data**

<b>Single Family &amp; Multi Family Vermont Household Data (by Square Footage)</b>			
Home Sq. Footage	# of homes (according to 2005 RASS data)	% of Homes in Vermont (Sq. Ft.)	Avg. # of persons per HH (Sq. Ft.)
<b>Single:</b>			
<800	13	3.92%	1.77
800-1199	35	10.54%	2.23
1200-1599	76	22.89%	2.44
1600-1999	53	15.96%	2.96
2000-2499	82	24.70%	2.98
2500-2999	38	11.45%	2.77
>3000	35	10.54%	2.94
<b>Multi:</b>			
<800	7	14.00%	1.29
800-1199	20	40.00%	2.05
1200-1599	8	16.00%	2.00
1600-1999	6	12.00%	3.33
2000-2499	6	12.00%	2.17
2500-2999	2	4.00%	3.00
>3000	1	2.00%	4.00

<b>Single Family &amp; Multi Family Vermont Household Data (by # of bedrooms)</b>		
No. of Bedrooms	# of homes (according to 2005 RASS data)	% of homes in Vermont
<b>Single Family</b>		
1 Bedroom	18	3.59%
2 Bedroom	100	19.92%
3 Bedroom	240	47.81%
4 Bedroom	111	22.11%
5+ Bedroom	33	6.57%
<b>Multi Family</b>		
1 Bedroom	20	22.73%
2 Bedroom	35	39.77%
3 Bedroom	26	29.55%
4 Bedroom	6	6.82%
5+ Bedroom	1	1.14%



## **APPENDIX A-6**

### **Residential Program Budgets**

Table A-9: Single Family Program Budgets (without incentives) by Year

Single Family		\$ per kWh Saved or Per Participant	Amount	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	Refrigerator Turn-in	Per participant	\$92.53	\$163,222.92	\$163,222.92	\$163,222.92	\$163,222.92	\$163,222.92	\$163,222.92	\$163,222.92	\$163,222.92	\$163,222.92	\$163,222.92
2	Freezer Turn-in	Per participant	\$92.53	\$22,299.73	\$22,299.73	\$22,299.73	\$22,299.73	\$22,299.73	\$22,299.73	\$22,299.73	\$22,299.73	\$22,299.73	\$22,299.73
3	Room AC Turn-in without Replacement	Per participant	\$117.53	\$214,492.25	\$214,492.25	\$214,492.25	\$214,492.25	\$214,492.25	\$214,492.25	\$214,492.25	\$214,492.25	\$214,492.25	\$214,492.25
4	Room AC Turn-in with ES Replacement	Per participant	\$107.53	\$196,242.25	\$196,242.25	\$196,242.25	\$196,242.25	\$196,242.25	\$196,242.25	\$196,242.25	\$196,242.25	\$196,242.25	\$196,242.25
				<b>\$596,257.15</b>	<b>\$596,257.15</b>	<b>\$596,257.15</b>	<b>\$596,257.15</b>	<b>\$596,257.15</b>	<b>\$596,257.15</b>	<b>\$596,257.15</b>	<b>\$596,257.15</b>	<b>\$596,257.15</b>	<b>\$596,257.15</b>
5	Energy Star Single Room Air Conditioner	Per kWh	\$0.0637	\$10,336.73	\$10,336.73	\$10,336.73	\$10,336.73	\$10,336.73	\$10,336.73	\$10,336.73	\$10,336.73	\$10,336.73	\$10,336.73
6	Energy Star Compliant Top Freezer Refrigerator	Per kWh	\$0.0637	\$45,604.10	\$45,604.10	\$45,604.10	\$45,604.10	\$45,604.10	\$45,604.10	\$45,604.10	\$45,604.10	\$45,604.10	\$45,604.10
7	Energy Star Compliant Bottom Mount Freezer Refrigerator	Per kWh	\$0.0637	\$6,184.76	\$6,184.76	\$6,184.76	\$6,184.76	\$6,184.76	\$6,184.76	\$6,184.76	\$6,184.76	\$6,184.76	\$6,184.76
8	Energy Star Compliant Side-by-Side Refrigerator	Per kWh	\$0.0637	\$21,343.64	\$21,343.64	\$21,343.64	\$21,343.64	\$21,343.64	\$21,343.64	\$21,343.64	\$21,343.64	\$21,343.64	\$21,343.64
9	Energy Star Compliant Upright Freezer (Manual Defrost)	Per kWh	\$0.0637	\$12,423.41	\$12,423.41	\$12,423.41	\$12,423.41	\$12,423.41	\$12,423.41	\$12,423.41	\$12,423.41	\$12,423.41	\$12,423.41
10	Energy Star Compliant Chest Freezer	Per kWh	\$0.0637	\$10,434.06	\$10,434.06	\$10,434.06	\$10,434.06	\$10,434.06	\$10,434.06	\$10,434.06	\$10,434.06	\$10,434.06	\$10,434.06
11	Energy Star Built-In Dishwasher (Electric)	Per kWh	\$0.0637	\$39,498.08	\$39,498.08	\$39,498.08	\$39,498.08	\$39,498.08	\$39,498.08	\$39,498.08	\$39,498.08	\$39,498.08	\$39,498.08
12	Energy Star Clothes Washers with Electric Water Heater	Per kWh	\$0.0637	\$33,826.99	\$33,826.99	\$33,826.99	\$33,826.99	\$33,826.99	\$33,826.99	\$33,826.99	\$33,826.99	\$33,826.99	\$33,826.99
13	Energy Star Clothes Washers with Non-Electric Water Heater	Per kWh	\$0.0637	\$17,399.72	\$17,399.72	\$17,399.72	\$17,399.72	\$17,399.72	\$17,399.72	\$17,399.72	\$17,399.72	\$17,399.72	\$17,399.72
14	Energy Star Dehumidifier (40 pt)	Per kWh	\$0.0637	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75
				<b>\$249,000.24</b>	<b>\$249,000.24</b>	<b>\$249,000.24</b>	<b>\$249,000.24</b>	<b>\$249,000.24</b>	<b>\$249,000.24</b>	<b>\$249,000.24</b>	<b>\$249,000.24</b>	<b>\$249,000.24</b>	<b>\$249,000.24</b>
15	Standby-Power	Per kWh	\$0.0637	\$280,992.80	\$280,992.80	\$280,992.80	\$280,992.80	\$280,992.80	\$280,992.80	\$280,992.80	\$280,992.80	\$280,992.80	\$280,992.80
				<b>\$280,992.80</b>	<b>\$280,992.80</b>	<b>\$280,992.80</b>	<b>\$280,992.80</b>	<b>\$280,992.80</b>	<b>\$280,992.80</b>	<b>\$280,992.80</b>	<b>\$280,992.80</b>	<b>\$280,992.80</b>	<b>\$280,992.80</b>
16	Pool Pump & Motor	Per kWh	\$0.0637	\$63,505.72	\$63,505.72	\$63,505.72	\$63,505.72	\$63,505.72	\$63,505.72	\$63,505.72	\$63,505.72	\$63,505.72	\$63,505.72
				<b>\$63,505.72</b>	<b>\$63,505.72</b>	<b>\$63,505.72</b>	<b>\$63,505.72</b>	<b>\$63,505.72</b>	<b>\$63,505.72</b>	<b>\$63,505.72</b>	<b>\$63,505.72</b>	<b>\$63,505.72</b>	<b>\$63,505.72</b>
17	Energy Star Compliant Programmable Thermostat	Per kWh	\$0.0637	\$13,896.28	\$13,896.28	\$13,896.28	\$13,896.28	\$13,896.28	\$13,896.28	\$13,896.28	\$13,896.28	\$13,896.28	\$13,896.28
				<b>\$13,896.28</b>	<b>\$13,896.28</b>	<b>\$13,896.28</b>	<b>\$13,896.28</b>	<b>\$13,896.28</b>	<b>\$13,896.28</b>	<b>\$13,896.28</b>	<b>\$13,896.28</b>	<b>\$13,896.28</b>	<b>\$13,896.28</b>
18	High Efficiency Central AC	Per kWh	\$0.0637	\$6,587.73	\$6,587.73	\$6,587.73	\$6,587.73	\$6,587.73	\$6,587.73	\$6,587.73	\$6,587.73	\$6,587.73	\$6,587.73
				<b>\$6,587.73</b>	<b>\$6,587.73</b>	<b>\$6,587.73</b>	<b>\$6,587.73</b>	<b>\$6,587.73</b>	<b>\$6,587.73</b>	<b>\$6,587.73</b>	<b>\$6,587.73</b>	<b>\$6,587.73</b>	<b>\$6,587.73</b>
19	CFL's: Homes with partial CFL installation	Per Participant	\$5.54	\$1,245,724.40	\$1,245,724.40	\$1,245,724.40	\$1,245,724.40	\$1,245,724.40	\$1,245,724.40	\$1,245,724.40	\$1,245,724.40	\$1,245,724.40	\$1,245,724.40
20	CFL's: Homes without CFL installation	Per participant	\$5.54	\$1,358,651.76	\$1,358,651.76	\$1,358,651.76	\$1,358,651.76	\$1,358,651.76	\$1,358,651.76	\$1,358,651.76	\$1,358,651.76	\$1,358,651.76	\$1,358,651.76
				<b>\$2,604,376.16</b>	<b>\$2,604,376.16</b>	<b>\$2,604,376.16</b>	<b>\$2,604,376.16</b>	<b>\$2,604,376.16</b>	<b>\$2,604,376.16</b>	<b>\$2,604,376.16</b>	<b>\$2,604,376.16</b>	<b>\$2,604,376.16</b>	<b>\$2,604,376.16</b>
21	Water Heater Blanket	Per kWh	\$0.0637	\$27,677.65	\$27,677.65	\$27,677.65	\$27,677.65	\$27,677.65	\$27,677.65	\$27,677.65	\$27,677.65	\$27,677.65	\$27,677.65
22	Low Flow Shower Head	Per kWh	\$0.0637	\$43,770.82	\$43,770.82	\$43,770.82	\$43,770.82	\$43,770.82	\$43,770.82	\$43,770.82	\$43,770.82	\$43,770.82	\$43,770.82
23	Pipe Wrap	Per kWh	\$0.0637	\$3,970.87	\$3,970.87	\$3,970.87	\$3,970.87	\$3,970.87	\$3,970.87	\$3,970.87	\$3,970.87	\$3,970.87	\$3,970.87
24	Low Flow Faucet Aerator	Per kWh	\$0.0637	\$7,338.05	\$7,338.05	\$7,338.05	\$7,338.05	\$7,338.05	\$7,338.05	\$7,338.05	\$7,338.05	\$7,338.05	\$7,338.05
25	Solar Water Heating	Per kWh	\$0.0637	\$100,121.11	\$100,121.11	\$100,121.11	\$100,121.11	\$100,121.11	\$100,121.11	\$100,121.11	\$100,121.11	\$100,121.11	\$100,121.11
26	Efficient Water Heating	Per kWh	\$0.0637	\$111,701.39	\$111,701.39	\$111,701.39	\$111,701.39	\$111,701.39	\$111,701.39	\$111,701.39	\$111,701.39	\$111,701.39	\$111,701.39
				<b>\$294,579.89</b>	<b>\$294,579.89</b>	<b>\$294,579.89</b>	<b>\$294,579.89</b>	<b>\$294,579.89</b>	<b>\$294,579.89</b>	<b>\$294,579.89</b>	<b>\$294,579.89</b>	<b>\$294,579.89</b>	<b>\$294,579.89</b>
27	Efficient Furnace Fan Motor (Fuel Oil)	Per kWh	\$0.0637	\$52,031.18	\$52,031.18	\$52,031.18	\$52,031.18	\$52,031.18	\$52,031.18	\$52,031.18	\$52,031.18	\$52,031.18	\$52,031.18
28	Efficient Furnace Fan Motor (Natural Gas)	Per kWh	\$0.0637	\$10,977.17	\$10,977.17	\$10,977.17	\$10,977.17	\$10,977.17	\$10,977.17	\$10,977.17	\$10,977.17	\$10,977.17	\$10,977.17
29	Efficient Furnace Fan Motor (Propane)	Per kWh	\$0.0637	\$15,038.42	\$15,038.42	\$15,038.42	\$15,038.42	\$15,038.42	\$15,038.42	\$15,038.42	\$15,038.42	\$15,038.42	\$15,038.42
				<b>\$78,046.77</b>	<b>\$78,046.77</b>	<b>\$78,046.77</b>	<b>\$78,046.77</b>	<b>\$78,046.77</b>	<b>\$78,046.77</b>	<b>\$78,046.77</b>	<b>\$78,046.77</b>	<b>\$78,046.77</b>	<b>\$78,046.77</b>
30	Energy Star Windows - Electric Heat and no AC	Per kWh	\$0.3056	\$155,856.00	\$155,856.00	\$155,856.00	\$155,856.00	\$155,856.00	\$155,856.00	\$155,856.00	\$155,856.00	\$155,856.00	\$155,856.00
				<b>\$155,856.00</b>	<b>\$155,856.00</b>	<b>\$155,856.00</b>	<b>\$155,856.00</b>	<b>\$155,856.00</b>	<b>\$155,856.00</b>	<b>\$155,856.00</b>	<b>\$155,856.00</b>	<b>\$155,856.00</b>	<b>\$155,856.00</b>
31	Insulation and Weatherization - Electric Heat and no AC	Per kWh	\$0.3056	\$33,004.80	\$33,004.80	\$33,004.80	\$33,004.80	\$33,004.80	\$33,004.80	\$33,004.80	\$33,004.80	\$33,004.80	\$33,004.80
				<b>\$33,004.80</b>	<b>\$33,004.80</b>	<b>\$33,004.80</b>	<b>\$33,004.80</b>	<b>\$33,004.80</b>	<b>\$33,004.80</b>	<b>\$33,004.80</b>	<b>\$33,004.80</b>	<b>\$33,004.80</b>	<b>\$33,004.80</b>
32	Residential New Construction	Per Participant	\$2,450.77	\$1,878,466.19	\$2,311,958.39	\$2,745,450.58	\$3,178,942.78	\$3,612,434.98	\$4,045,927.18	\$4,479,419.38	\$4,912,911.57	\$5,346,403.77	\$5,779,895.97
				<b>\$1,878,466.19</b>	<b>\$2,311,958.39</b>	<b>\$2,745,450.58</b>	<b>\$3,178,942.78</b>	<b>\$3,612,434.98</b>	<b>\$4,045,927.18</b>	<b>\$4,479,419.38</b>	<b>\$4,912,911.57</b>	<b>\$5,346,403.77</b>	<b>\$5,779,895.97</b>
Single Family / Low Income				2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
33	Insulation and Weatherization - Electric Heat and no AC	Per kWh	\$0.3056	\$64,176.00	\$64,176.00	\$64,176.00	\$64,176.00	\$64,176.00	\$64,176.00	\$64,176.00	\$64,176.00	\$64,176.00	\$64,176.00
				<b>\$64,176.00</b>	<b>\$64,176.00</b>	<b>\$64,176.00</b>	<b>\$64,176.00</b>	<b>\$64,176.00</b>	<b>\$64,176.00</b>	<b>\$64,176.00</b>	<b>\$64,176.00</b>	<b>\$64,176.00</b>	<b>\$64,176.00</b>
Total for All Programs:				<b>\$6,318,745.72</b>	<b>\$6,752,237.92</b>	<b>\$7,185,730.12</b>	<b>\$7,619,222.32</b>	<b>\$8,052,714.51</b>	<b>\$8,486,206.71</b>	<b>\$8,919,698.91</b>	<b>\$9,353,191.11</b>	<b>\$9,786,683.30</b>	<b>\$10,220,175.50</b>

**Table A-10: Single Family Program Budgets (without incentives) by Year**  
**Fuel-Switching Programs**

Single Family		\$ per kWh Saved or Per Participant	Amount	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
34	Water Heater-Elec. To Natural Gas (1 Bedroom)	Per kWh	0.0637	\$1,528.80	\$1,528.80	\$1,528.80	\$1,528.80	\$1,528.80	\$1,528.80	\$1,528.80	\$1,528.80	\$1,528.80	\$1,528.80
35	Water Heater-Elec. To Natural Gas (2 Bedroom)	Per kWh	0.0637	\$11,083.80	\$11,083.80	\$11,083.80	\$11,083.80	\$11,083.80	\$11,083.80	\$11,083.80	\$11,083.80	\$11,083.80	\$11,083.80
36	Water Heater-Elec. To Natural Gas (3 Bedroom)	Per kWh	0.0637	\$31,875.48	\$31,875.48	\$31,875.48	\$31,875.48	\$31,875.48	\$31,875.48	\$31,875.48	\$31,875.48	\$31,875.48	\$31,875.48
37	Water Heater-Elec. To Natural Gas (4 Bedroom)	Per kWh	0.0637	\$18,345.60	\$18,345.60	\$18,345.60	\$18,345.60	\$18,345.60	\$18,345.60	\$18,345.60	\$18,345.60	\$18,345.60	\$18,345.60
38	Water Heater-Elec. To Natural Gas (5+ Bedroom)	Per kWh	0.0637	\$6,535.62	\$6,535.62	\$6,535.62	\$6,535.62	\$6,535.62	\$6,535.62	\$6,535.62	\$6,535.62	\$6,535.62	\$6,535.62
				<b>\$69,369.30</b>	<b>\$69,369.30</b>	<b>\$69,369.30</b>	<b>\$69,369.30</b>	<b>\$69,369.30</b>	<b>\$69,369.30</b>	<b>\$69,369.30</b>	<b>\$69,369.30</b>	<b>\$69,369.30</b>	<b>\$69,369.30</b>
39	Water Heater-Elec. To Fuel Oil (1 Bedroom)	Per kWh	0.0637	\$21,097.44	\$21,097.44	\$21,097.44	\$21,097.44	\$21,097.44	\$21,097.44	\$21,097.44	\$21,097.44	\$21,097.44	\$21,097.44
40	Water Heater-Elec. To Fuel Oil (2 Bedroom)	Per kWh	0.0637	\$146,764.80	\$146,764.80	\$146,764.80	\$146,764.80	\$146,764.80	\$146,764.80	\$146,764.80	\$146,764.80	\$146,764.80	\$146,764.80
41	Water Heater-Elec. To Fuel Oil (3 Bedroom)	Per kWh	0.0637	\$422,636.76	\$422,636.76	\$422,636.76	\$422,636.76	\$422,636.76	\$422,636.76	\$422,636.76	\$422,636.76	\$422,636.76	\$422,636.76
42	Water Heater-Elec. To Fuel Oil (4 Bedroom)	Per kWh	0.0637	\$244,225.80	\$244,225.80	\$244,225.80	\$244,225.80	\$244,225.80	\$244,225.80	\$244,225.80	\$244,225.80	\$244,225.80	\$244,225.80
43	Water Heater-Elec. To Fuel Oil (5+ Bedroom)	Per kWh	0.0637	\$87,026.94	\$87,026.94	\$87,026.94	\$87,026.94	\$87,026.94	\$87,026.94	\$87,026.94	\$87,026.94	\$87,026.94	\$87,026.94
				<b>\$921,751.74</b>	<b>\$921,751.74</b>	<b>\$921,751.74</b>	<b>\$921,751.74</b>	<b>\$921,751.74</b>	<b>\$921,751.74</b>	<b>\$921,751.74</b>	<b>\$921,751.74</b>	<b>\$921,751.74</b>	<b>\$921,751.74</b>
44	Water Heater-Elec. To Propane (1 Bedroom)	Per kWh	0.0637	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52
45	Water Heater-Elec. To Propane (2 Bedroom)	Per kWh	0.0637	\$30,958.20	\$30,958.20	\$30,958.20	\$30,958.20	\$30,958.20	\$30,958.20	\$30,958.20	\$30,958.20	\$30,958.20	\$30,958.20
46	Water Heater-Elec. To Propane (3 Bedroom)	Per kWh	0.0637	\$89,205.48	\$89,205.48	\$89,205.48	\$89,205.48	\$89,205.48	\$89,205.48	\$89,205.48	\$89,205.48	\$89,205.48	\$89,205.48
47	Water Heater-Elec. To Propane (4 Bedroom)	Per kWh	0.0637	\$51,597.00	\$51,597.00	\$51,597.00	\$51,597.00	\$51,597.00	\$51,597.00	\$51,597.00	\$51,597.00	\$51,597.00	\$51,597.00
48	Water Heater-Elec. To Propane (5+ Bedroom)	Per kWh	0.0637	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94
				<b>\$194,425.14</b>	<b>\$194,425.14</b>	<b>\$194,425.14</b>	<b>\$194,425.14</b>	<b>\$194,425.14</b>	<b>\$194,425.14</b>	<b>\$194,425.14</b>	<b>\$194,425.14</b>	<b>\$194,425.14</b>	<b>\$194,425.14</b>
49	Water Heater-Elec. To Kerosene (1 Bedroom)	Per kWh	0.0637	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52	\$4,433.52
50	Water Heater-Elec. To Kerosene (2 Bedroom)	Per kWh	0.0637	\$30,767.10	\$30,767.10	\$30,767.10	\$30,767.10	\$30,767.10	\$30,767.10	\$30,767.10	\$30,767.10	\$30,767.10	\$30,767.10
51	Water Heater-Elec. To Kerosene (3 Bedroom)	Per kWh	0.0637	\$88,517.52	\$88,517.52	\$88,517.52	\$88,517.52	\$88,517.52	\$88,517.52	\$88,517.52	\$88,517.52	\$88,517.52	\$88,517.52
52	Water Heater-Elec. To Kerosene (4 Bedroom)	Per kWh	0.0637	\$51,023.70	\$51,023.70	\$51,023.70	\$51,023.70	\$51,023.70	\$51,023.70	\$51,023.70	\$51,023.70	\$51,023.70	\$51,023.70
53	Water Heater-Elec. To Kerosene (5+ Bedroom)	Per kWh	0.0637	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94	\$18,230.94
				<b>\$192,972.78</b>	<b>\$192,972.78</b>	<b>\$192,972.78</b>	<b>\$192,972.78</b>	<b>\$192,972.78</b>	<b>\$192,972.78</b>	<b>\$192,972.78</b>	<b>\$192,972.78</b>	<b>\$192,972.78</b>	<b>\$192,972.78</b>
54	WH Fuel Switching (Electric to Kerosene- Stand Alone)	Per kWh	0.0637	\$236,491.51	\$236,491.51	\$236,491.51	\$236,491.51	\$236,491.51	\$236,491.51	\$236,491.51	\$236,491.51	\$236,491.51	\$236,491.51
				<b>\$236,491.51</b>	<b>\$236,491.51</b>	<b>\$236,491.51</b>	<b>\$236,491.51</b>	<b>\$236,491.51</b>	<b>\$236,491.51</b>	<b>\$236,491.51</b>	<b>\$236,491.51</b>	<b>\$236,491.51</b>	<b>\$236,491.51</b>
55	WH Fuel Switching (Electric to Wood)	Per kWh	0.0637	\$206,783.48	\$206,783.48	\$206,783.48	\$206,783.48	\$206,783.48	\$206,783.48	\$206,783.48	\$206,783.48	\$206,783.48	\$206,783.48
				<b>\$206,783.48</b>	<b>\$206,783.48</b>	<b>\$206,783.48</b>	<b>\$206,783.48</b>	<b>\$206,783.48</b>	<b>\$206,783.48</b>	<b>\$206,783.48</b>	<b>\$206,783.48</b>	<b>\$206,783.48</b>	<b>\$206,783.48</b>
56	Space Heating (Fuel Switching)	Per kWh	0.3056	\$1,252,960.00	\$1,252,960.00	\$1,252,960.00	\$1,252,960.00	\$1,252,960.00	\$1,252,960.00	\$1,252,960.00	\$1,252,960.00	\$1,252,960.00	\$1,252,960.00
				<b>\$1,252,960.00</b>	<b>\$1,252,960.00</b>	<b>\$1,252,960.00</b>	<b>\$1,252,960.00</b>	<b>\$1,252,960.00</b>	<b>\$1,252,960.00</b>	<b>\$1,252,960.00</b>	<b>\$1,252,960.00</b>	<b>\$1,252,960.00</b>	<b>\$1,252,960.00</b>
57	Clothes Dryer (Fuel Switching)	Per kWh	0.0637	\$133,392.00	\$133,392.00	\$133,392.00	\$133,392.00	\$133,392.00	\$133,392.00	\$133,392.00	\$133,392.00	\$133,392.00	\$133,392.00
				<b>\$133,392.00</b>	<b>\$133,392.00</b>	<b>\$133,392.00</b>	<b>\$133,392.00</b>	<b>\$133,392.00</b>	<b>\$133,392.00</b>	<b>\$133,392.00</b>	<b>\$133,392.00</b>	<b>\$133,392.00</b>	<b>\$133,392.00</b>
Total for All Programs:				<b>\$3,208,145.95</b>	<b>\$3,208,145.95</b>	<b>\$3,208,145.95</b>	<b>\$3,208,145.95</b>	<b>\$3,208,145.95</b>	<b>\$3,208,145.95</b>	<b>\$3,208,145.95</b>	<b>\$3,208,145.95</b>	<b>\$3,208,145.95</b>	<b>\$3,208,145.95</b>

Table A-11: Single Family Incentive Budgets by Year

Single Family		Incremental \$	Incentive \$	\$2,006	\$2,007	\$2,008	\$2,009	\$2,010	\$2,011	\$2,012	\$2,013	\$2,014	\$2,015
1	Refrigerator Turn-in	\$50.00	\$50.00	\$88,200.00	\$88,200.00	\$88,200.00	\$88,200.00	\$88,200.00	\$88,200.00	\$88,200.00	\$88,200.00	\$88,200.00	\$88,200.00
2	Freezer Turn-in	\$50.00	\$50.00	\$12,050.00	\$12,050.00	\$12,050.00	\$12,050.00	\$12,050.00	\$12,050.00	\$12,050.00	\$12,050.00	\$12,050.00	\$12,050.00
3	Room AC Turn-in without Replacement	\$25.00	\$25.00	\$45,625.00	\$45,625.00	\$45,625.00	\$45,625.00	\$45,625.00	\$45,625.00	\$45,625.00	\$45,625.00	\$45,625.00	\$45,625.00
4	Room AC Turn-in with ES Replacement	\$35.00	\$35.00	\$63,875.00	\$63,875.00	\$63,875.00	\$63,875.00	\$63,875.00	\$63,875.00	\$63,875.00	\$63,875.00	\$63,875.00	\$63,875.00
				\$209,750.00	\$209,750.00	\$209,750.00	\$209,750.00	\$209,750.00	\$209,750.00	\$209,750.00	\$209,750.00	\$209,750.00	\$209,750.00
5	Energy Star Single Room Air Conditioner	\$30.00	\$15.00	\$55,320.00	\$55,320.00	\$55,320.00	\$55,320.00	\$55,320.00	\$55,320.00	\$55,320.00	\$55,320.00	\$55,320.00	\$55,320.00
6	Energy Star Compliant Top Freezer Refrigerator	\$30.00	\$15.00	\$134,235.00	\$134,235.00	\$134,235.00	\$134,235.00	\$134,235.00	\$134,235.00	\$134,235.00	\$134,235.00	\$134,235.00	\$134,235.00
7	Energy Star Compliant Bottom Mount Freezer Refrigerator	\$30.00	\$15.00	\$16,740.00	\$16,740.00	\$16,740.00	\$16,740.00	\$16,740.00	\$16,740.00	\$16,740.00	\$16,740.00	\$16,740.00	\$16,740.00
8	Energy Star Compliant Side-by-Side Refrigerator	\$30.00	\$15.00	\$52,905.00	\$52,905.00	\$52,905.00	\$52,905.00	\$52,905.00	\$52,905.00	\$52,905.00	\$52,905.00	\$52,905.00	\$52,905.00
9	Energy Star Compliant Upright Freezer (Manual Defrost)	\$33.00	\$16.50	\$58,509.00	\$58,509.00	\$58,509.00	\$58,509.00	\$58,509.00	\$58,509.00	\$58,509.00	\$58,509.00	\$58,509.00	\$58,509.00
10	Energy Star Compliant Chest Freezer	\$33.00	\$16.50	\$51,975.00	\$51,975.00	\$51,975.00	\$51,975.00	\$51,975.00	\$51,975.00	\$51,975.00	\$51,975.00	\$51,975.00	\$51,975.00
11	Energy Star Built-In Dishwasher (Electric)	\$50.00	\$25.00	\$215,300.00	\$215,300.00	\$215,300.00	\$215,300.00	\$215,300.00	\$215,300.00	\$215,300.00	\$215,300.00	\$215,300.00	\$215,300.00
12	Energy Star Clothes Washers with Electric Water Heater	\$300.00	\$150.00	\$737,550.00	\$737,550.00	\$737,550.00	\$737,550.00	\$737,550.00	\$737,550.00	\$737,550.00	\$737,550.00	\$737,550.00	\$737,550.00
13	Energy Star Clothes Washers with Non-Electric Water Heater	\$300.00	\$150.00	\$1,412,850.00	\$1,412,850.00	\$1,412,850.00	\$1,412,850.00	\$1,412,850.00	\$1,412,850.00	\$1,412,850.00	\$1,412,850.00	\$1,412,850.00	\$1,412,850.00
14	Energy Star Dehumidifier (40 pt)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
				\$2,735,384.00	\$2,735,384.00	\$2,735,384.00	\$2,735,384.00	\$2,735,384.00	\$2,735,384.00	\$2,735,384.00	\$2,735,384.00	\$2,735,384.00	\$2,735,384.00
15	Standby-Power	\$30.00	\$15.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00
				\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00	\$249,690.00
16	Pool Pump & Motor	\$313.00	\$156.50	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00
				\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00	\$245,705.00
17	Energy Star Compliant Programmable Thermostat	\$50.00	\$25.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00
				\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00	\$18,425.00
18	High Efficiency Central AC	\$379.00	\$189.50	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00
				\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00	\$62,914.00
19	CFL's: Homes with partial CFL installation	\$5.00	\$2.00	\$449,720.00	\$449,720.00	\$449,720.00	\$449,720.00	\$449,720.00	\$449,720.00	\$449,720.00	\$449,720.00	\$449,720.00	\$449,720.00
20	CFL's: Homes without CFL installation	\$5.00	\$2.00	\$490,488.00	\$490,488.00	\$490,488.00	\$490,488.00	\$490,488.00	\$490,488.00	\$490,488.00	\$490,488.00	\$490,488.00	\$490,488.00
				\$940,208.00	\$940,208.00	\$940,208.00	\$940,208.00	\$940,208.00	\$940,208.00	\$940,208.00	\$940,208.00	\$940,208.00	\$940,208.00
21	Water Heater Blanket	\$35.00	\$17.50	\$30,415.00	\$30,415.00	\$30,415.00	\$30,415.00	\$30,415.00	\$30,415.00	\$30,415.00	\$30,415.00	\$30,415.00	\$30,415.00
22	Low Flow Shower Head	\$15.00	\$7.50	\$15,157.50	\$15,157.50	\$15,157.50	\$15,157.50	\$15,157.50	\$15,157.50	\$15,157.50	\$15,157.50	\$15,157.50	\$15,157.50
23	Pipe Wrap	\$15.00	\$7.50	\$14,167.50	\$14,167.50	\$14,167.50	\$14,167.50	\$14,167.50	\$14,167.50	\$14,167.50	\$14,167.50	\$14,167.50	\$14,167.50
24	Low Flow Faucet Aerator	\$6.00	\$3.00	\$6,063.00	\$6,063.00	\$6,063.00	\$6,063.00	\$6,063.00	\$6,063.00	\$6,063.00	\$6,063.00	\$6,063.00	\$6,063.00
25	Solar Water Heating	\$4,500.00	\$900.00	\$849,600.00	\$849,600.00	\$849,600.00	\$849,600.00	\$849,600.00	\$849,600.00	\$849,600.00	\$849,600.00	\$849,600.00	\$849,600.00
26	Efficient Water Heating	\$90.00	\$45.00	\$242,055.00	\$242,055.00	\$242,055.00	\$242,055.00	\$242,055.00	\$242,055.00	\$242,055.00	\$242,055.00	\$242,055.00	\$242,055.00
				\$1,157,458.00	\$1,157,458.00	\$1,157,458.00	\$1,157,458.00	\$1,157,458.00	\$1,157,458.00	\$1,157,458.00	\$1,157,458.00	\$1,157,458.00	\$1,157,458.00
27	Efficient Furnace Fan Motor (Fuel Oil)	\$200.00	\$100.00	\$176,800.00	\$176,800.00	\$176,800.00	\$176,800.00	\$176,800.00	\$176,800.00	\$176,800.00	\$176,800.00	\$176,800.00	\$176,800.00
28	Efficient Furnace Fan Motor (Natural Gas)	\$200.00	\$100.00	\$37,300.00	\$37,300.00	\$37,300.00	\$37,300.00	\$37,300.00	\$37,300.00	\$37,300.00	\$37,300.00	\$37,300.00	\$37,300.00
29	Efficient Furnace Fan Motor (Propane)	\$200.00	\$100.00	\$51,100.00	\$51,100.00	\$51,100.00	\$51,100.00	\$51,100.00	\$51,100.00	\$51,100.00	\$51,100.00	\$51,100.00	\$51,100.00
				\$265,200.00	\$265,200.00	\$265,200.00	\$265,200.00	\$265,200.00	\$265,200.00	\$265,200.00	\$265,200.00	\$265,200.00	\$265,200.00
30	Energy Star Windows - Electric Heat and no AC	\$200.00	\$100.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00
				\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00	\$10,200.00
31	Insulation and Weatherization - Electric Heat and no AC	\$2,000.00	\$1,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00
				\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00	\$18,000.00
32	Residential New Construction	\$997.51	\$652.92	\$500,450.12	\$615,938.61	\$731,427.10	\$846,915.59	\$962,404.08	\$1,077,892.57	\$1,193,381.06	\$1,308,869.55	\$1,424,358.04	\$1,539,846.53
				\$500,450.12	\$615,938.61	\$731,427.10	\$846,915.59	\$962,404.08	\$1,077,892.57	\$1,193,381.06	\$1,308,869.55	\$1,424,358.04	\$1,539,846.53
Single Family / Low Income				2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
33	Insulation and Weatherization - Electric Heat and no AC	\$2,000.00	\$2,000.00	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000
				\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00
Total for All Programs:				\$6,483,384.12	\$6,598,872.61	\$6,714,361.10	\$6,829,849.59	\$6,945,338.08	\$7,060,826.57	\$7,176,315.06	\$7,291,803.55	\$7,407,292.04	\$7,522,780.53

**Table A-12: Single Family Incentive Budgets by Year**  
**Fuel-Switching Programs**

Single Family		Incremental \$	Incentive \$	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
34	Water Heater-Elec. To Natural Gas (1 Bedroom)	\$500.00	\$250.00	\$2,500.00	\$2,500.00	\$2,500.00	\$2,500.00	\$2,500.00	\$2,500.00	\$2,500.00	\$2,500.00	\$2,500.00	\$2,500.00
35	Water Heater-Elec. To Natural Gas (2 Bedroom)	\$500.00	\$250.00	\$14,500.00	\$14,500.00	\$14,500.00	\$14,500.00	\$14,500.00	\$14,500.00	\$14,500.00	\$14,500.00	\$14,500.00	\$14,500.00
36	Water Heater-Elec. To Natural Gas (3 Bedroom)	\$500.00	\$250.00	\$34,750.00	\$34,750.00	\$34,750.00	\$34,750.00	\$34,750.00	\$34,750.00	\$34,750.00	\$34,750.00	\$34,750.00	\$34,750.00
37	Water Heater-Elec. To Natural Gas (4 Bedroom)	\$500.00	\$250.00	\$16,000.00	\$16,000.00	\$16,000.00	\$16,000.00	\$16,000.00	\$16,000.00	\$16,000.00	\$16,000.00	\$16,000.00	\$16,000.00
38	Water Heater-Elec. To Natural Gas (5+ Bedroom)	\$500.00	\$250.00	\$4,750.00	\$4,750.00	\$4,750.00	\$4,750.00	\$4,750.00	\$4,750.00	\$4,750.00	\$4,750.00	\$4,750.00	\$4,750.00
				<b>\$72,500.00</b>	<b>\$72,500.00</b>	<b>\$72,500.00</b>	<b>\$72,500.00</b>	<b>\$72,500.00</b>	<b>\$72,500.00</b>	<b>\$72,500.00</b>	<b>\$72,500.00</b>	<b>\$72,500.00</b>	<b>\$72,500.00</b>
39	Water Heater-Elec. To Fuel Oil (1 Bedroom)	\$1,575.00	\$787.50	\$108,675.00	\$108,675.00	\$108,675.00	\$108,675.00	\$108,675.00	\$108,675.00	\$108,675.00	\$108,675.00	\$108,675.00	\$108,675.00
40	Water Heater-Elec. To Fuel Oil (2 Bedroom)	\$1,575.00	\$787.50	\$604,800.00	\$604,800.00	\$604,800.00	\$604,800.00	\$604,800.00	\$604,800.00	\$604,800.00	\$604,800.00	\$604,800.00	\$604,800.00
41	Water Heater-Elec. To Fuel Oil (3 Bedroom)	\$1,575.00	\$787.50	\$1,451,362.50	\$1,451,362.50	\$1,451,362.50	\$1,451,362.50	\$1,451,362.50	\$1,451,362.50	\$1,451,362.50	\$1,451,362.50	\$1,451,362.50	\$1,451,362.50
42	Water Heater-Elec. To Fuel Oil (4 Bedroom)	\$1,575.00	\$787.50	\$670,950.00	\$670,950.00	\$670,950.00	\$670,950.00	\$670,950.00	\$670,950.00	\$670,950.00	\$670,950.00	\$670,950.00	\$670,950.00
43	Water Heater-Elec. To Fuel Oil (5+ Bedroom)	\$1,575.00	\$787.50	\$199,237.50	\$199,237.50	\$199,237.50	\$199,237.50	\$199,237.50	\$199,237.50	\$199,237.50	\$199,237.50	\$199,237.50	\$199,237.50
				<b>\$3,035,025.00</b>	<b>\$3,035,025.00</b>	<b>\$3,035,025.00</b>	<b>\$3,035,025.00</b>	<b>\$3,035,025.00</b>	<b>\$3,035,025.00</b>	<b>\$3,035,025.00</b>	<b>\$3,035,025.00</b>	<b>\$3,035,025.00</b>	<b>\$3,035,025.00</b>
44	Water Heater-Elec. To Propane (1 Bedroom)	\$800.00	\$400.00	\$11,600.00	\$11,600.00	\$11,600.00	\$11,600.00	\$11,600.00	\$11,600.00	\$11,600.00	\$11,600.00	\$11,600.00	\$11,600.00
45	Water Heater-Elec. To Propane (2 Bedroom)	\$800.00	\$400.00	\$64,800.00	\$64,800.00	\$64,800.00	\$64,800.00	\$64,800.00	\$64,800.00	\$64,800.00	\$64,800.00	\$64,800.00	\$64,800.00
46	Water Heater-Elec. To Propane (3 Bedroom)	\$800.00	\$400.00	\$155,600.00	\$155,600.00	\$155,600.00	\$155,600.00	\$155,600.00	\$155,600.00	\$155,600.00	\$155,600.00	\$155,600.00	\$155,600.00
47	Water Heater-Elec. To Propane (4 Bedroom)	\$800.00	\$400.00	\$72,000.00	\$72,000.00	\$72,000.00	\$72,000.00	\$72,000.00	\$72,000.00	\$72,000.00	\$72,000.00	\$72,000.00	\$72,000.00
48	Water Heater-Elec. To Propane (5+ Bedroom)	\$800.00	\$400.00	\$21,200.00	\$21,200.00	\$21,200.00	\$21,200.00	\$21,200.00	\$21,200.00	\$21,200.00	\$21,200.00	\$21,200.00	\$21,200.00
				<b>\$325,200.00</b>	<b>\$325,200.00</b>	<b>\$325,200.00</b>	<b>\$325,200.00</b>	<b>\$325,200.00</b>	<b>\$325,200.00</b>	<b>\$325,200.00</b>	<b>\$325,200.00</b>	<b>\$325,200.00</b>	<b>\$325,200.00</b>
49	Water Heater-Elec. To Kerosene (1 Bedroom)	\$2,000.00	\$1,000.00	\$29,000.00	\$29,000.00	\$29,000.00	\$29,000.00	\$29,000.00	\$29,000.00	\$29,000.00	\$29,000.00	\$29,000.00	\$29,000.00
50	Water Heater-Elec. To Kerosene (2 Bedroom)	\$2,000.00	\$1,000.00	\$161,000.00	\$161,000.00	\$161,000.00	\$161,000.00	\$161,000.00	\$161,000.00	\$161,000.00	\$161,000.00	\$161,000.00	\$161,000.00
51	Water Heater-Elec. To Kerosene (3 Bedroom)	\$2,000.00	\$1,000.00	\$386,000.00	\$386,000.00	\$386,000.00	\$386,000.00	\$386,000.00	\$386,000.00	\$386,000.00	\$386,000.00	\$386,000.00	\$386,000.00
52	Water Heater-Elec. To Kerosene (4 Bedroom)	\$2,000.00	\$1,000.00	\$178,000.00	\$178,000.00	\$178,000.00	\$178,000.00	\$178,000.00	\$178,000.00	\$178,000.00	\$178,000.00	\$178,000.00	\$178,000.00
53	Water Heater-Elec. To Kerosene (5+ Bedroom)	\$2,000.00	\$1,000.00	\$53,000.00	\$53,000.00	\$53,000.00	\$53,000.00	\$53,000.00	\$53,000.00	\$53,000.00	\$53,000.00	\$53,000.00	\$53,000.00
				<b>\$807,000.00</b>	<b>\$807,000.00</b>	<b>\$807,000.00</b>	<b>\$807,000.00</b>	<b>\$807,000.00</b>	<b>\$807,000.00</b>	<b>\$807,000.00</b>	<b>\$807,000.00</b>	<b>\$807,000.00</b>	<b>\$807,000.00</b>
54	WH Fuel Switching (Electric to Kerosene- Stand Alone)	\$1,880.00	\$940.00	\$1,137,400.00	\$1,137,400.00	\$1,137,400.00	\$1,137,400.00	\$1,137,400.00	\$1,137,400.00	\$1,137,400.00	\$1,137,400.00	\$1,137,400.00	\$1,137,400.00
				<b>\$1,137,400.00</b>	<b>\$1,137,400.00</b>	<b>\$1,137,400.00</b>	<b>\$1,137,400.00</b>	<b>\$1,137,400.00</b>	<b>\$1,137,400.00</b>	<b>\$1,137,400.00</b>	<b>\$1,137,400.00</b>	<b>\$1,137,400.00</b>	<b>\$1,137,400.00</b>
55	WH Fuel Switching (Electric to Wood)	\$1,320.00	\$660.00	\$698,280.00	\$698,280.00	\$698,280.00	\$698,280.00	\$698,280.00	\$698,280.00	\$698,280.00	\$698,280.00	\$698,280.00	\$698,280.00
				<b>\$698,280.00</b>	<b>\$698,280.00</b>	<b>\$698,280.00</b>	<b>\$698,280.00</b>	<b>\$698,280.00</b>	<b>\$698,280.00</b>	<b>\$698,280.00</b>	<b>\$698,280.00</b>	<b>\$698,280.00</b>	<b>\$698,280.00</b>
56	Space Heating (Fuel Switching)	\$6,500.00	\$3,250.00	\$666,250.00	\$666,250.00	\$666,250.00	\$666,250.00	\$666,250.00	\$666,250.00	\$666,250.00	\$666,250.00	\$666,250.00	\$666,250.00
				<b>\$666,250.00</b>	<b>\$666,250.00</b>	<b>\$666,250.00</b>	<b>\$666,250.00</b>	<b>\$666,250.00</b>	<b>\$666,250.00</b>	<b>\$666,250.00</b>	<b>\$666,250.00</b>	<b>\$666,250.00</b>	<b>\$666,250.00</b>
57	Clothes Dryer (Fuel Switching)	\$375.00	\$187.50	\$416,812.50	\$416,812.50	\$416,812.50	\$416,812.50	\$416,812.50	\$416,812.50	\$416,812.50	\$416,812.50	\$416,812.50	\$416,812.50
				<b>\$416,812.50</b>	<b>\$416,812.50</b>	<b>\$416,812.50</b>	<b>\$416,812.50</b>	<b>\$416,812.50</b>	<b>\$416,812.50</b>	<b>\$416,812.50</b>	<b>\$416,812.50</b>	<b>\$416,812.50</b>	<b>\$416,812.50</b>
<b>Total for All Programs:</b>				<b>\$7,158,467.50</b>	<b>\$7,158,467.50</b>	<b>\$7,158,467.50</b>	<b>\$7,158,467.50</b>	<b>\$7,158,467.50</b>	<b>\$7,158,467.50</b>	<b>\$7,158,467.50</b>	<b>\$7,158,467.50</b>	<b>\$7,158,467.50</b>	<b>\$7,158,467.50</b>

Table A-13: Single Family Total Budgets by Year

Single Family		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	Refrigerator Turn-in	\$251,422.92	\$251,422.92	\$251,422.92	\$251,422.92	\$251,422.92	\$251,422.92	\$251,422.92	\$251,422.92	\$251,422.92	\$251,422.92
2	Freezer Turn-in	\$34,349.73	\$34,349.73	\$34,349.73	\$34,349.73	\$34,349.73	\$34,349.73	\$34,349.73	\$34,349.73	\$34,349.73	\$34,349.73
3	Room AC Turn-in without Replacement	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25
4	Room AC Turn-in with ES Replacement	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25	\$260,117.25
		\$806,007.15	\$806,007.15	\$806,007.15	\$806,007.15	\$806,007.15	\$806,007.15	\$806,007.15	\$806,007.15	\$806,007.15	\$806,007.15
5	Energy Star Single Room Air Conditioner	\$65,656.73	\$65,656.73	\$65,656.73	\$65,656.73	\$65,656.73	\$65,656.73	\$65,656.73	\$65,656.73	\$65,656.73	\$65,656.73
6	Energy Star Compliant Top Freezer Refrigerator	\$179,839.10	\$179,839.10	\$179,839.10	\$179,839.10	\$179,839.10	\$179,839.10	\$179,839.10	\$179,839.10	\$179,839.10	\$179,839.10
7	Energy Star Compliant Bottom Mount Freezer Refrigerator	\$22,924.76	\$22,924.76	\$22,924.76	\$22,924.76	\$22,924.76	\$22,924.76	\$22,924.76	\$22,924.76	\$22,924.76	\$22,924.76
8	Energy Star Compliant Side-by-Side Refrigerator	\$74,248.64	\$74,248.64	\$74,248.64	\$74,248.64	\$74,248.64	\$74,248.64	\$74,248.64	\$74,248.64	\$74,248.64	\$74,248.64
9	Energy Star Compliant Upright Freezer (Manual Defrost)	\$70,932.41	\$70,932.41	\$70,932.41	\$70,932.41	\$70,932.41	\$70,932.41	\$70,932.41	\$70,932.41	\$70,932.41	\$70,932.41
10	Energy Star Compliant Chest Freezer	\$62,409.06	\$62,409.06	\$62,409.06	\$62,409.06	\$62,409.06	\$62,409.06	\$62,409.06	\$62,409.06	\$62,409.06	\$62,409.06
11	Energy Star Built-In Dishwasher (Electric)	\$254,798.08	\$254,798.08	\$254,798.08	\$254,798.08	\$254,798.08	\$254,798.08	\$254,798.08	\$254,798.08	\$254,798.08	\$254,798.08
12	Energy Star Clothes Washers with Electric Water Heater	\$771,376.99	\$771,376.99	\$771,376.99	\$771,376.99	\$771,376.99	\$771,376.99	\$771,376.99	\$771,376.99	\$771,376.99	\$771,376.99
13	Energy Star Clothes Washers with Non-Electric Water Heater	\$1,430,249.72	\$1,430,249.72	\$1,430,249.72	\$1,430,249.72	\$1,430,249.72	\$1,430,249.72	\$1,430,249.72	\$1,430,249.72	\$1,430,249.72	\$1,430,249.72
14	Energy Star Dehumidifier (40 pt)	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75	\$51,948.75
		\$2,984,384.24	\$2,984,384.24	\$2,984,384.24	\$2,984,384.24	\$2,984,384.24	\$2,984,384.24	\$2,984,384.24	\$2,984,384.24	\$2,984,384.24	\$2,984,384.24
15	Standby-Power	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80
		\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80	\$530,682.80
16	Pool Pump & Motor	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72
		\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72	\$309,210.72
17	Energy Star Compliant Programmable Thermostat	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28
		\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28	\$32,321.28
18	High Efficiency Central AC	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73
		\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73	\$69,501.73
19	CFL's: Homes with partial CFL installation	\$1,695,444.40	\$1,695,444.40	\$1,695,444.40	\$1,695,444.40	\$1,695,444.40	\$1,695,444.40	\$1,695,444.40	\$1,695,444.40	\$1,695,444.40	\$1,695,444.40
20	CFL's: Homes without CFL installation	\$1,849,139.76	\$1,849,139.76	\$1,849,139.76	\$1,849,139.76	\$1,849,139.76	\$1,849,139.76	\$1,849,139.76	\$1,849,139.76	\$1,849,139.76	\$1,849,139.76
		\$3,544,584.16	\$3,544,584.16	\$3,544,584.16	\$3,544,584.16	\$3,544,584.16	\$3,544,584.16	\$3,544,584.16	\$3,544,584.16	\$3,544,584.16	\$3,544,584.16
21	Water Heater Blanket	\$58,092.65	\$58,092.65	\$58,092.65	\$58,092.65	\$58,092.65	\$58,092.65	\$58,092.65	\$58,092.65	\$58,092.65	\$58,092.65
22	Low Flow Shower Head	\$58,928.32	\$58,928.32	\$58,928.32	\$58,928.32	\$58,928.32	\$58,928.32	\$58,928.32	\$58,928.32	\$58,928.32	\$58,928.32
23	Pipe Wrap	\$18,138.37	\$18,138.37	\$18,138.37	\$18,138.37	\$18,138.37	\$18,138.37	\$18,138.37	\$18,138.37	\$18,138.37	\$18,138.37
24	Low Flow Faucet Aerator	\$13,401.05	\$13,401.05	\$13,401.05	\$13,401.05	\$13,401.05	\$13,401.05	\$13,401.05	\$13,401.05	\$13,401.05	\$13,401.05
25	Solar Water Heating	\$949,721.11	\$949,721.11	\$949,721.11	\$949,721.11	\$949,721.11	\$949,721.11	\$949,721.11	\$949,721.11	\$949,721.11	\$949,721.11
26	Efficient Water Heating	\$353,756.39	\$353,756.39	\$353,756.39	\$353,756.39	\$353,756.39	\$353,756.39	\$353,756.39	\$353,756.39	\$353,756.39	\$353,756.39
		\$1,452,037.89	\$1,452,037.89	\$1,452,037.89	\$1,452,037.89	\$1,452,037.89	\$1,452,037.89	\$1,452,037.89	\$1,452,037.89	\$1,452,037.89	\$1,452,037.89
27	Efficient Furnace Fan Motor (Fuel Oil)	\$228,831.18	\$228,831.18	\$228,831.18	\$228,831.18	\$228,831.18	\$228,831.18	\$228,831.18	\$228,831.18	\$228,831.18	\$228,831.18
28	Efficient Furnace Fan Motor (Natural Gas)	\$48,277.17	\$48,277.17	\$48,277.17	\$48,277.17	\$48,277.17	\$48,277.17	\$48,277.17	\$48,277.17	\$48,277.17	\$48,277.17
29	Efficient Furnace Fan Motor (Propane)	\$66,138.42	\$66,138.42	\$66,138.42	\$66,138.42	\$66,138.42	\$66,138.42	\$66,138.42	\$66,138.42	\$66,138.42	\$66,138.42
		\$343,246.77	\$343,246.77	\$343,246.77	\$343,246.77	\$343,246.77	\$343,246.77	\$343,246.77	\$343,246.77	\$343,246.77	\$343,246.77
30	Energy Star Windows - Electric Heat and no AC	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00
		\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00	\$166,056.00
31	Insulation and Weatherization - Electric Heat and no AC	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80
		\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80	\$51,004.80
32	Residential New Construction	\$2,378,916.31	\$2,927,897.00	\$3,476,877.69	\$4,025,858.37	\$4,574,839.06	\$5,123,819.75	\$5,672,800.43	\$6,221,781.12	\$6,770,761.81	\$7,319,742.50
		\$2,378,916.31	\$2,927,897.00	\$3,476,877.69	\$4,025,858.37	\$4,574,839.06	\$5,123,819.75	\$5,672,800.43	\$6,221,781.12	\$6,770,761.81	\$7,319,742.50
Single Family / Low Income		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
33	Insulation and Weatherization - Electric Heat and no AC	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00
		\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00	\$134,176.00
Total for All Programs:		\$12,802,129.85	\$13,351,110.53	\$13,900,091.22	\$14,449,071.91	\$14,998,052.59	\$15,547,033.28	\$16,096,013.97	\$16,644,994.66	\$17,193,975.34	\$17,742,956.03

**Table A-14: Single Family Total Budgets by Year  
Fuel-Switching Programs**

Single Family		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
34	Water Heater-Elec. To Natural Gas (1 Bedroom)	\$4,028.80	\$4,028.80	\$4,028.80	\$4,028.80	\$4,028.80	\$4,028.80	\$4,028.80	\$4,028.80	\$4,028.80	\$4,028.80
35	Water Heater-Elec. To Natural Gas (2 Bedroom)	\$25,583.80	\$25,583.80	\$25,583.80	\$25,583.80	\$25,583.80	\$25,583.80	\$25,583.80	\$25,583.80	\$25,583.80	\$25,583.80
36	Water Heater-Elec. To Natural Gas (3 Bedroom)	\$66,625.48	\$66,625.48	\$66,625.48	\$66,625.48	\$66,625.48	\$66,625.48	\$66,625.48	\$66,625.48	\$66,625.48	\$66,625.48
37	Water Heater-Elec. To Natural Gas (4 Bedroom)	\$34,345.60	\$34,345.60	\$34,345.60	\$34,345.60	\$34,345.60	\$34,345.60	\$34,345.60	\$34,345.60	\$34,345.60	\$34,345.60
38	Water Heater-Elec. To Natural Gas (5+ Bedroom)	\$11,285.62	\$11,285.62	\$11,285.62	\$11,285.62	\$11,285.62	\$11,285.62	\$11,285.62	\$11,285.62	\$11,285.62	\$11,285.62
		<b>\$141,869.30</b>	<b>\$141,869.30</b>	<b>\$141,869.30</b>	<b>\$141,869.30</b>	<b>\$141,869.30</b>	<b>\$141,869.30</b>	<b>\$141,869.30</b>	<b>\$141,869.30</b>	<b>\$141,869.30</b>	<b>\$141,869.30</b>
39	Water Heater-Elec. To Fuel Oil (1 Bedroom)	\$129,772.44	\$129,772.44	\$129,772.44	\$129,772.44	\$129,772.44	\$129,772.44	\$129,772.44	\$129,772.44	\$129,772.44	\$129,772.44
40	Water Heater-Elec. To Fuel Oil (2 Bedroom)	\$751,564.80	\$751,564.80	\$751,564.80	\$751,564.80	\$751,564.80	\$751,564.80	\$751,564.80	\$751,564.80	\$751,564.80	\$751,564.80
41	Water Heater-Elec. To Fuel Oil (3 Bedroom)	\$1,873,999.26	\$1,873,999.26	\$1,873,999.26	\$1,873,999.26	\$1,873,999.26	\$1,873,999.26	\$1,873,999.26	\$1,873,999.26	\$1,873,999.26	\$1,873,999.26
42	Water Heater-Elec. To Fuel Oil (4 Bedroom)	\$915,175.80	\$915,175.80	\$915,175.80	\$915,175.80	\$915,175.80	\$915,175.80	\$915,175.80	\$915,175.80	\$915,175.80	\$915,175.80
43	Water Heater-Elec. To Fuel Oil (5+ Bedroom)	\$286,264.44	\$286,264.44	\$286,264.44	\$286,264.44	\$286,264.44	\$286,264.44	\$286,264.44	\$286,264.44	\$286,264.44	\$286,264.44
		<b>\$3,956,776.74</b>	<b>\$3,956,776.74</b>	<b>\$3,956,776.74</b>	<b>\$3,956,776.74</b>	<b>\$3,956,776.74</b>	<b>\$3,956,776.74</b>	<b>\$3,956,776.74</b>	<b>\$3,956,776.74</b>	<b>\$3,956,776.74</b>	<b>\$3,956,776.74</b>
44	Water Heater-Elec. To Propane (1 Bedroom)	\$16,033.52	\$16,033.52	\$16,033.52	\$16,033.52	\$16,033.52	\$16,033.52	\$16,033.52	\$16,033.52	\$16,033.52	\$16,033.52
45	Water Heater-Elec. To Propane (2 Bedroom)	\$95,758.20	\$95,758.20	\$95,758.20	\$95,758.20	\$95,758.20	\$95,758.20	\$95,758.20	\$95,758.20	\$95,758.20	\$95,758.20
46	Water Heater-Elec. To Propane (3 Bedroom)	\$244,805.48	\$244,805.48	\$244,805.48	\$244,805.48	\$244,805.48	\$244,805.48	\$244,805.48	\$244,805.48	\$244,805.48	\$244,805.48
47	Water Heater-Elec. To Propane (4 Bedroom)	\$123,597.00	\$123,597.00	\$123,597.00	\$123,597.00	\$123,597.00	\$123,597.00	\$123,597.00	\$123,597.00	\$123,597.00	\$123,597.00
48	Water Heater-Elec. To Propane (5+ Bedroom)	\$39,430.94	\$39,430.94	\$39,430.94	\$39,430.94	\$39,430.94	\$39,430.94	\$39,430.94	\$39,430.94	\$39,430.94	\$39,430.94
		<b>\$519,625.14</b>	<b>\$519,625.14</b>	<b>\$519,625.14</b>	<b>\$519,625.14</b>	<b>\$519,625.14</b>	<b>\$519,625.14</b>	<b>\$519,625.14</b>	<b>\$519,625.14</b>	<b>\$519,625.14</b>	<b>\$519,625.14</b>
49	Water Heater-Elec. To Kerosene (1 Bedroom)	\$33,433.52	\$33,433.52	\$33,433.52	\$33,433.52	\$33,433.52	\$33,433.52	\$33,433.52	\$33,433.52	\$33,433.52	\$33,433.52
50	Water Heater-Elec. To Kerosene (2 Bedroom)	\$191,767.10	\$191,767.10	\$191,767.10	\$191,767.10	\$191,767.10	\$191,767.10	\$191,767.10	\$191,767.10	\$191,767.10	\$191,767.10
51	Water Heater-Elec. To Kerosene (3 Bedroom)	\$474,517.52	\$474,517.52	\$474,517.52	\$474,517.52	\$474,517.52	\$474,517.52	\$474,517.52	\$474,517.52	\$474,517.52	\$474,517.52
52	Water Heater-Elec. To Kerosene (4 Bedroom)	\$229,023.70	\$229,023.70	\$229,023.70	\$229,023.70	\$229,023.70	\$229,023.70	\$229,023.70	\$229,023.70	\$229,023.70	\$229,023.70
53	Water Heater-Elec. To Kerosene (5+ Bedroom)	\$71,230.94	\$71,230.94	\$71,230.94	\$71,230.94	\$71,230.94	\$71,230.94	\$71,230.94	\$71,230.94	\$71,230.94	\$71,230.94
		<b>\$999,972.78</b>	<b>\$999,972.78</b>	<b>\$999,972.78</b>	<b>\$999,972.78</b>	<b>\$999,972.78</b>	<b>\$999,972.78</b>	<b>\$999,972.78</b>	<b>\$999,972.78</b>	<b>\$999,972.78</b>	<b>\$999,972.78</b>
54	WH Fuel Switching (Electric to Kerosene- Stand Alone)	\$1,373,891.51	\$1,373,891.51	\$1,373,891.51	\$1,373,891.51	\$1,373,891.51	\$1,373,891.51	\$1,373,891.51	\$1,373,891.51	\$1,373,891.51	\$1,373,891.51
		<b>\$1,373,891.51</b>	<b>\$1,373,891.51</b>	<b>\$1,373,891.51</b>	<b>\$1,373,891.51</b>	<b>\$1,373,891.51</b>	<b>\$1,373,891.51</b>	<b>\$1,373,891.51</b>	<b>\$1,373,891.51</b>	<b>\$1,373,891.51</b>	<b>\$1,373,891.51</b>
55	WH Fuel Switching (Electric to Wood)	\$905,063.48	\$905,063.48	\$905,063.48	\$905,063.48	\$905,063.48	\$905,063.48	\$905,063.48	\$905,063.48	\$905,063.48	\$905,063.48
		<b>\$905,063.48</b>	<b>\$905,063.48</b>	<b>\$905,063.48</b>	<b>\$905,063.48</b>	<b>\$905,063.48</b>	<b>\$905,063.48</b>	<b>\$905,063.48</b>	<b>\$905,063.48</b>	<b>\$905,063.48</b>	<b>\$905,063.48</b>
56	Space Heating (Fuel Switching)	\$1,919,210.00	\$1,919,210.00	\$1,919,210.00	\$1,919,210.00	\$1,919,210.00	\$1,919,210.00	\$1,919,210.00	\$1,919,210.00	\$1,919,210.00	\$1,919,210.00
		<b>\$1,919,210.00</b>	<b>\$1,919,210.00</b>	<b>\$1,919,210.00</b>	<b>\$1,919,210.00</b>	<b>\$1,919,210.00</b>	<b>\$1,919,210.00</b>	<b>\$1,919,210.00</b>	<b>\$1,919,210.00</b>	<b>\$1,919,210.00</b>	<b>\$1,919,210.00</b>
57	Clothes Dryer (Fuel Switching)	\$550,204.50	\$550,204.50	\$550,204.50	\$550,204.50	\$550,204.50	\$550,204.50	\$550,204.50	\$550,204.50	\$550,204.50	\$550,204.50
		<b>\$550,204.50</b>	<b>\$550,204.50</b>	<b>\$550,204.50</b>	<b>\$550,204.50</b>	<b>\$550,204.50</b>	<b>\$550,204.50</b>	<b>\$550,204.50</b>	<b>\$550,204.50</b>	<b>\$550,204.50</b>	<b>\$550,204.50</b>
Total for All Programs:		<b>\$10,366,613.45</b>	<b>\$10,366,613.45</b>	<b>\$10,366,613.45</b>	<b>\$10,366,613.45</b>	<b>\$10,366,613.45</b>	<b>\$10,366,613.45</b>	<b>\$10,366,613.45</b>	<b>\$10,366,613.45</b>	<b>\$10,366,613.45</b>	<b>\$10,366,613.45</b>

Table A-15: Multi Family Program Budgets (without incentives) by Year

Multi Family		\$ per kWh Saved or		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
		Per Participant	Amount										
1	Refrigerator Turn-in	Per participant	\$92.53	\$29,979.72	\$29,979.72	\$29,979.72	\$29,979.72	\$29,979.72	\$29,979.72	\$29,979.72	\$29,979.72	\$29,979.72	\$29,979.72
2	Freezer Turn-in	Per participant	\$92.53	\$4,071.32	\$4,071.32	\$4,071.32	\$4,071.32	\$4,071.32	\$4,071.32	\$4,071.32	\$4,071.32	\$4,071.32	\$4,071.32
3	Room AC Turn-in without Replacement	Per participant	\$117.53	\$39,372.55	\$39,372.55	\$39,372.55	\$39,372.55	\$39,372.55	\$39,372.55	\$39,372.55	\$39,372.55	\$39,372.55	\$39,372.55
4	Room AC Turn-in with ES Replacement	Per participant	\$107.53	\$36,022.55	\$36,022.55	\$36,022.55	\$36,022.55	\$36,022.55	\$36,022.55	\$36,022.55	\$36,022.55	\$36,022.55	\$36,022.55
				<b>\$109,446.14</b>	<b>\$109,446.14</b>	<b>\$109,446.14</b>	<b>\$109,446.14</b>	<b>\$109,446.14</b>	<b>\$109,446.14</b>	<b>\$109,446.14</b>	<b>\$109,446.14</b>	<b>\$109,446.14</b>	<b>\$109,446.14</b>
5	Energy Star Single Room Air Conditioner	Per kWh	\$0.0637	\$1,894.69	\$1,894.69	\$1,894.69	\$1,894.69	\$1,894.69	\$1,894.69	\$1,894.69	\$1,894.69	\$1,894.69	\$1,894.69
6	Energy Star Compliant Top Freezer Refrigerator	Per kWh	\$0.0637	\$8,367.63	\$8,367.63	\$8,367.63	\$8,367.63	\$8,367.63	\$8,367.63	\$8,367.63	\$8,367.63	\$8,367.63	\$8,367.63
7	Energy Star Compliant Bottom Mount Freezer Refrigerator	Per kWh	\$0.0637	\$1,136.09	\$1,136.09	\$1,136.09	\$1,136.09	\$1,136.09	\$1,136.09	\$1,136.09	\$1,136.09	\$1,136.09	\$1,136.09
8	Energy Star Compliant Side-by-Side Refrigerator	Per kWh	\$0.0637	\$3,915.32	\$3,915.32	\$3,915.32	\$3,915.32	\$3,915.32	\$3,915.32	\$3,915.32	\$3,915.32	\$3,915.32	\$3,915.32
9	Energy Star Compliant Upright Freezer (Manual Defrost)	Per kWh	\$0.0637	\$2,277.28	\$2,277.28	\$2,277.28	\$2,277.28	\$2,277.28	\$2,277.28	\$2,277.28	\$2,277.28	\$2,277.28	\$2,277.28
10	Energy Star Compliant Chest Freezer	Per kWh	\$0.0637	\$1,914.57	\$1,914.57	\$1,914.57	\$1,914.57	\$1,914.57	\$1,914.57	\$1,914.57	\$1,914.57	\$1,914.57	\$1,914.57
11	Energy Star Built-In Dishwasher (Electric)	Per kWh	\$0.0637	\$7,246.51	\$7,246.51	\$7,246.51	\$7,246.51	\$7,246.51	\$7,246.51	\$7,246.51	\$7,246.51	\$7,246.51	\$7,246.51
12	Energy Star Clothes Washers with Electric Water Heater	Per kWh	\$0.0637	\$6,205.40	\$6,205.40	\$6,205.40	\$6,205.40	\$6,205.40	\$6,205.40	\$6,205.40	\$6,205.40	\$6,205.40	\$6,205.40
13	Energy Star Clothes Washers with Non-Electric Water Heater	Per kWh	\$0.0637	\$3,192.13	\$3,192.13	\$3,192.13	\$3,192.13	\$3,192.13	\$3,192.13	\$3,192.13	\$3,192.13	\$3,192.13	\$3,192.13
14	Energy Star Dehumidifier (40 pt)	Per kWh	\$0.0637	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39
				<b>\$45,682.01</b>	<b>\$45,682.01</b>	<b>\$45,682.01</b>	<b>\$45,682.01</b>	<b>\$45,682.01</b>	<b>\$45,682.01</b>	<b>\$45,682.01</b>	<b>\$45,682.01</b>	<b>\$45,682.01</b>	<b>\$45,682.01</b>
15	Standby-Power	Per kWh	\$0.0637	\$51,536.17	\$51,536.17	\$51,536.17	\$51,536.17	\$51,536.17	\$51,536.17	\$51,536.17	\$51,536.17	\$51,536.17	\$51,536.17
				<b>\$51,536.17</b>	<b>\$51,536.17</b>	<b>\$51,536.17</b>	<b>\$51,536.17</b>	<b>\$51,536.17</b>	<b>\$51,536.17</b>	<b>\$51,536.17</b>	<b>\$51,536.17</b>	<b>\$51,536.17</b>	<b>\$51,536.17</b>
16	Pool Pump & Motor	Per kWh	\$0.0637	\$4,409.00	\$4,409.00	\$4,409.00	\$4,409.00	\$4,409.00	\$4,409.00	\$4,409.00	\$4,409.00	\$4,409.00	\$4,409.00
				<b>\$4,409.00</b>	<b>\$4,409.00</b>	<b>\$4,409.00</b>	<b>\$4,409.00</b>	<b>\$4,409.00</b>	<b>\$4,409.00</b>	<b>\$4,409.00</b>	<b>\$4,409.00</b>	<b>\$4,409.00</b>	<b>\$4,409.00</b>
17	Energy Star Compliant Programmable Thermostat	Per kWh	\$0.0637	\$2,545.45	\$2,545.45	\$2,545.45	\$2,545.45	\$2,545.45	\$2,545.45	\$2,545.45	\$2,545.45	\$2,545.45	\$2,545.45
				<b>\$2,545.45</b>	<b>\$2,545.45</b>	<b>\$2,545.45</b>	<b>\$2,545.45</b>	<b>\$2,545.45</b>	<b>\$2,545.45</b>	<b>\$2,545.45</b>	<b>\$2,545.45</b>	<b>\$2,545.45</b>	<b>\$2,545.45</b>
18	High Efficiency Central AC	Per kWh	\$0.0637	\$1,210.40	\$1,210.40	\$1,210.40	\$1,210.40	\$1,210.40	\$1,210.40	\$1,210.40	\$1,210.40	\$1,210.40	\$1,210.40
				<b>\$1,210.40</b>	<b>\$1,210.40</b>	<b>\$1,210.40</b>	<b>\$1,210.40</b>	<b>\$1,210.40</b>	<b>\$1,210.40</b>	<b>\$1,210.40</b>	<b>\$1,210.40</b>	<b>\$1,210.40</b>	<b>\$1,210.40</b>
19	CFL's: Homes with partial CFL installation	Per Participant	\$5.54	\$228,508.38	\$228,508.38	\$228,508.38	\$228,508.38	\$228,508.38	\$228,508.38	\$228,508.38	\$228,508.38	\$228,508.38	\$228,508.38
20	CFL's: Homes without CFL installation	Per participant	\$5.54	\$249,222.44	\$249,222.44	\$249,222.44	\$249,222.44	\$249,222.44	\$249,222.44	\$249,222.44	\$249,222.44	\$249,222.44	\$249,222.44
				<b>\$477,730.82</b>	<b>\$477,730.82</b>	<b>\$477,730.82</b>	<b>\$477,730.82</b>	<b>\$477,730.82</b>	<b>\$477,730.82</b>	<b>\$477,730.82</b>	<b>\$477,730.82</b>	<b>\$477,730.82</b>	<b>\$477,730.82</b>
21	Water Heater Blanket	Per kWh	\$0.0637	\$5,733.00	\$5,733.00	\$5,733.00	\$5,733.00	\$5,733.00	\$5,733.00	\$5,733.00	\$5,733.00	\$5,733.00	\$5,733.00
22	Low Flow Shower Head	Per kWh	\$0.0637	\$9,053.04	\$9,053.04	\$9,053.04	\$9,053.04	\$9,053.04	\$9,053.04	\$9,053.04	\$9,053.04	\$9,053.04	\$9,053.04
23	Pipe Wrap	Per kWh	\$0.0637	\$821.92	\$821.92	\$821.92	\$821.92	\$821.92	\$821.92	\$821.92	\$821.92	\$821.92	\$821.92
24	Low Flow Faucet Aerator	Per kWh	\$0.0637	\$1,517.72	\$1,517.72	\$1,517.72	\$1,517.72	\$1,517.72	\$1,517.72	\$1,517.72	\$1,517.72	\$1,517.72	\$1,517.72
25	Solar Water Heating	Per kWh	\$0.0637	\$20,681.80	\$20,681.80	\$20,681.80	\$20,681.80	\$20,681.80	\$20,681.80	\$20,681.80	\$20,681.80	\$20,681.80	\$20,681.80
26	Efficient Water Heating	Per kWh	\$0.0637	\$23,092.01	\$23,092.01	\$23,092.01	\$23,092.01	\$23,092.01	\$23,092.01	\$23,092.01	\$23,092.01	\$23,092.01	\$23,092.01
				<b>\$60,899.49</b>	<b>\$60,899.49</b>	<b>\$60,899.49</b>	<b>\$60,899.49</b>	<b>\$60,899.49</b>	<b>\$60,899.49</b>	<b>\$60,899.49</b>	<b>\$60,899.49</b>	<b>\$60,899.49</b>	<b>\$60,899.49</b>
27	Efficient Furnace Fan Motor (Fuel Oil)	Per kWh	\$0.0637	\$5,974.17	\$5,974.17	\$5,974.17	\$5,974.17	\$5,974.17	\$5,974.17	\$5,974.17	\$5,974.17	\$5,974.17	\$5,974.17
28	Efficient Furnace Fan Motor (Natural Gas)	Per kWh	\$0.0637	\$5,385.58	\$5,385.58	\$5,385.58	\$5,385.58	\$5,385.58	\$5,385.58	\$5,385.58	\$5,385.58	\$5,385.58	\$5,385.58
29	Efficient Furnace Fan Motor (Propane)	Per kWh	\$0.0637	\$2,383.78	\$2,383.78	\$2,383.78	\$2,383.78	\$2,383.78	\$2,383.78	\$2,383.78	\$2,383.78	\$2,383.78	\$2,383.78
				<b>\$13,743.53</b>	<b>\$13,743.53</b>	<b>\$13,743.53</b>	<b>\$13,743.53</b>	<b>\$13,743.53</b>	<b>\$13,743.53</b>	<b>\$13,743.53</b>	<b>\$13,743.53</b>	<b>\$13,743.53</b>	<b>\$13,743.53</b>
30	Energy Star Windows - Electric Heat and no AC	Per kWh	\$0.3056	\$14,516.00	\$14,516.00	\$14,516.00	\$14,516.00	\$14,516.00	\$14,516.00	\$14,516.00	\$14,516.00	\$14,516.00	\$14,516.00
				<b>\$14,516.00</b>	<b>\$14,516.00</b>	<b>\$14,516.00</b>	<b>\$14,516.00</b>	<b>\$14,516.00</b>	<b>\$14,516.00</b>	<b>\$14,516.00</b>	<b>\$14,516.00</b>	<b>\$14,516.00</b>	<b>\$14,516.00</b>
31	Insulation and Weatherization - Electric Heat and no AC	Per kWh	\$0.3056	\$2,750.40	\$2,750.40	\$2,750.40	\$2,750.40	\$2,750.40	\$2,750.40	\$2,750.40	\$2,750.40	\$2,750.40	\$2,750.40
				<b>\$2,750.40</b>	<b>\$2,750.40</b>	<b>\$2,750.40</b>	<b>\$2,750.40</b>	<b>\$2,750.40</b>	<b>\$2,750.40</b>	<b>\$2,750.40</b>	<b>\$2,750.40</b>	<b>\$2,750.40</b>	<b>\$2,750.40</b>
Multi Family / Low Income				2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
33	Insulation and Weatherization - Electric Heat and no AC	Per kWh	\$0.3056	\$32,088.00	\$32,088.00	\$32,088.00	\$32,088.00	\$32,088.00	\$32,088.00	\$32,088.00	\$32,088.00	\$32,088.00	\$32,088.00
				<b>\$32,088.00</b>	<b>\$32,088.00</b>	<b>\$32,088.00</b>	<b>\$32,088.00</b>	<b>\$32,088.00</b>	<b>\$32,088.00</b>	<b>\$32,088.00</b>	<b>\$32,088.00</b>	<b>\$32,088.00</b>	<b>\$32,088.00</b>
Total for All Programs:				<b>\$816,557.40</b>	<b>\$816,557.40</b>	<b>\$816,557.40</b>	<b>\$816,557.40</b>	<b>\$816,557.40</b>	<b>\$816,557.40</b>	<b>\$816,557.40</b>	<b>\$816,557.40</b>	<b>\$816,557.40</b>	<b>\$816,557.40</b>



**Table A-16: Multi Family Program Budgets (without incentives) by Year**  
**Fuel-Switching Programs**

Multi Family		\$ per kWh Saved or Per Participant	Amount	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
34	Water Heater-Elec. To Natural Gas (1 Bedroom)	Per kWh	0.0637	\$2,140.32	\$2,140.32	\$2,140.32	\$2,140.32	\$2,140.32	\$2,140.32	\$2,140.32	\$2,140.32	\$2,140.32	\$2,140.32
35	Water Heater-Elec. To Natural Gas (2 Bedroom)	Per kWh	0.0637	\$4,586.40	\$4,586.40	\$4,586.40	\$4,586.40	\$4,586.40	\$4,586.40	\$4,586.40	\$4,586.40	\$4,586.40	\$4,586.40
36	Water Heater-Elec. To Natural Gas (3 Bedroom)	Per kWh	0.0637	\$4,127.76	\$4,127.76	\$4,127.76	\$4,127.76	\$4,127.76	\$4,127.76	\$4,127.76	\$4,127.76	\$4,127.76	\$4,127.76
37	Water Heater-Elec. To Natural Gas (4 Bedroom)	Per kWh	0.0637	\$1,146.60	\$1,146.60	\$1,146.60	\$1,146.60	\$1,146.60	\$1,146.60	\$1,146.60	\$1,146.60	\$1,146.60	\$1,146.60
38	Water Heater-Elec. To Natural Gas (5+ Bedroom)	Per kWh	0.0637	\$343.98	\$343.98	\$343.98	\$343.98	\$343.98	\$343.98	\$343.98	\$343.98	\$343.98	\$343.98
				<b>\$12,345.06</b>	<b>\$12,345.06</b>	<b>\$12,345.06</b>	<b>\$12,345.06</b>	<b>\$12,345.06</b>	<b>\$12,345.06</b>	<b>\$12,345.06</b>	<b>\$12,345.06</b>	<b>\$12,345.06</b>	<b>\$12,345.06</b>
39	Water Heater-Elec. To Fuel Oil (1 Bedroom)	Per kWh	0.0637	\$27,671.28	\$27,671.28	\$27,671.28	\$27,671.28	\$27,671.28	\$27,671.28	\$27,671.28	\$27,671.28	\$27,671.28	\$27,671.28
40	Water Heater-Elec. To Fuel Oil (2 Bedroom)	Per kWh	0.0637	\$60,578.70	\$60,578.70	\$60,578.70	\$60,578.70	\$60,578.70	\$60,578.70	\$60,578.70	\$60,578.70	\$60,578.70	\$60,578.70
41	Water Heater-Elec. To Fuel Oil (3 Bedroom)	Per kWh	0.0637	\$54,119.52	\$54,119.52	\$54,119.52	\$54,119.52	\$54,119.52	\$54,119.52	\$54,119.52	\$54,119.52	\$54,119.52	\$54,119.52
42	Water Heater-Elec. To Fuel Oil (4 Bedroom)	Per kWh	0.0637	\$15,479.10	\$15,479.10	\$15,479.10	\$15,479.10	\$15,479.10	\$15,479.10	\$15,479.10	\$15,479.10	\$15,479.10	\$15,479.10
43	Water Heater-Elec. To Fuel Oil (5+ Bedroom)	Per kWh	0.0637	\$3,095.82	\$3,095.82	\$3,095.82	\$3,095.82	\$3,095.82	\$3,095.82	\$3,095.82	\$3,095.82	\$3,095.82	\$3,095.82
				<b>\$160,944.42</b>	<b>\$160,944.42</b>	<b>\$160,944.42</b>	<b>\$160,944.42</b>	<b>\$160,944.42</b>	<b>\$160,944.42</b>	<b>\$160,944.42</b>	<b>\$160,944.42</b>	<b>\$160,944.42</b>	<b>\$160,944.42</b>
44	Water Heater-Elec. To Propane (1 Bedroom)	Per kWh	0.0637	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44
45	Water Heater-Elec. To Propane (2 Bedroom)	Per kWh	0.0637	\$12,803.70	\$12,803.70	\$12,803.70	\$12,803.70	\$12,803.70	\$12,803.70	\$12,803.70	\$12,803.70	\$12,803.70	\$12,803.70
46	Water Heater-Elec. To Propane (3 Bedroom)	Per kWh	0.0637	\$11,466.00	\$11,466.00	\$11,466.00	\$11,466.00	\$11,466.00	\$11,466.00	\$11,466.00	\$11,466.00	\$11,466.00	\$11,466.00
47	Water Heater-Elec. To Propane (4 Bedroom)	Per kWh	0.0637	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15
48	Water Heater-Elec. To Propane (5+ Bedroom)	Per kWh	0.0637	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96
				<b>\$33,920.25</b>	<b>\$33,920.25</b>	<b>\$33,920.25</b>	<b>\$33,920.25</b>	<b>\$33,920.25</b>	<b>\$33,920.25</b>	<b>\$33,920.25</b>	<b>\$33,920.25</b>	<b>\$33,920.25</b>	<b>\$33,920.25</b>
49	Water Heater-Elec. To Kerosene (1 Bedroom)	Per kWh	0.0637	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44	\$5,809.44
50	Water Heater-Elec. To Kerosene (2 Bedroom)	Per kWh	0.0637	\$12,612.60	\$12,612.60	\$12,612.60	\$12,612.60	\$12,612.60	\$12,612.60	\$12,612.60	\$12,612.60	\$12,612.60	\$12,612.60
51	Water Heater-Elec. To Kerosene (3 Bedroom)	Per kWh	0.0637	\$11,236.68	\$11,236.68	\$11,236.68	\$11,236.68	\$11,236.68	\$11,236.68	\$11,236.68	\$11,236.68	\$11,236.68	\$11,236.68
52	Water Heater-Elec. To Kerosene (4 Bedroom)	Per kWh	0.0637	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15	\$3,153.15
53	Water Heater-Elec. To Kerosene (5+ Bedroom)	Per kWh	0.0637	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96	\$687.96
				<b>\$33,499.83</b>	<b>\$33,499.83</b>	<b>\$33,499.83</b>	<b>\$33,499.83</b>	<b>\$33,499.83</b>	<b>\$33,499.83</b>	<b>\$33,499.83</b>	<b>\$33,499.83</b>	<b>\$33,499.83</b>	<b>\$33,499.83</b>
54	WH Fuel Switching (Electric to Kerosene- Stand Alone)	Per kWh	0.0637	\$40,198.20	\$40,198.20	\$40,198.20	\$40,198.20	\$40,198.20	\$40,198.20	\$40,198.20	\$40,198.20	\$40,198.20	\$40,198.20
				<b>\$40,198.20</b>	<b>\$40,198.20</b>	<b>\$40,198.20</b>	<b>\$40,198.20</b>	<b>\$40,198.20</b>	<b>\$40,198.20</b>	<b>\$40,198.20</b>	<b>\$40,198.20</b>	<b>\$40,198.20</b>	<b>\$40,198.20</b>
55	WH Fuel Switching (Electric to Wood)	Per kWh	0.0637	\$35,213.63	\$35,213.63	\$35,213.63	\$35,213.63	\$35,213.63	\$35,213.63	\$35,213.63	\$35,213.63	\$35,213.63	\$35,213.63
				<b>\$35,213.63</b>	<b>\$35,213.63</b>	<b>\$35,213.63</b>	<b>\$35,213.63</b>	<b>\$35,213.63</b>	<b>\$35,213.63</b>	<b>\$35,213.63</b>	<b>\$35,213.63</b>	<b>\$35,213.63</b>	<b>\$35,213.63</b>
56	Space Heating (Fuel Switching)	Per kWh	0.3056	\$116,128.00	\$116,128.00	\$116,128.00	\$116,128.00	\$116,128.00	\$116,128.00	\$116,128.00	\$116,128.00	\$116,128.00	\$116,128.00
				<b>\$116,128.00</b>	<b>\$116,128.00</b>	<b>\$116,128.00</b>	<b>\$116,128.00</b>	<b>\$116,128.00</b>	<b>\$116,128.00</b>	<b>\$116,128.00</b>	<b>\$116,128.00</b>	<b>\$116,128.00</b>	<b>\$116,128.00</b>
57	Clothes Dryer (Fuel Switching)	Per kWh	0.0637	\$30,422.74	\$30,422.74	\$30,422.74	\$30,422.74	\$30,422.74	\$30,422.74	\$30,422.74	\$30,422.74	\$30,422.74	\$30,422.74
				<b>\$30,422.74</b>	<b>\$30,422.74</b>	<b>\$30,422.74</b>	<b>\$30,422.74</b>	<b>\$30,422.74</b>	<b>\$30,422.74</b>	<b>\$30,422.74</b>	<b>\$30,422.74</b>	<b>\$30,422.74</b>	<b>\$30,422.74</b>
<b>Total for All Programs:</b>				<b>\$462,672.13</b>	<b>\$462,672.13</b>	<b>\$462,672.13</b>	<b>\$462,672.13</b>	<b>\$462,672.13</b>	<b>\$462,672.13</b>	<b>\$462,672.13</b>	<b>\$462,672.13</b>	<b>\$462,672.13</b>	<b>\$462,672.13</b>

Table A-17: Multi Family Incentive Budgets by Year

Multi Family		Incremental \$	Incentive \$	\$2,006	\$2,007	\$2,008	\$2,009	\$2,010	\$2,011	\$2,012	\$2,013	\$2,014	\$2,015
1	Refrigerator Turn-in	\$50.00	\$50.00	\$16,200.00	\$16,200.00	\$16,200.00	\$16,200.00	\$16,200.00	\$16,200.00	\$16,200.00	\$16,200.00	\$16,200.00	\$16,200.00
2	Freezer Turn-in	\$50.00	\$50.00	\$2,200.00	\$2,200.00	\$2,200.00	\$2,200.00	\$2,200.00	\$2,200.00	\$2,200.00	\$2,200.00	\$2,200.00	\$2,200.00
3	Room AC Turn-in without Replacement	\$25.00	\$25.00	\$8,375.00	\$8,375.00	\$8,375.00	\$8,375.00	\$8,375.00	\$8,375.00	\$8,375.00	\$8,375.00	\$8,375.00	\$8,375.00
4	Room AC Turn-in with ES Replacement	\$35.00	\$35.00	\$11,725.00	\$11,725.00	\$11,725.00	\$11,725.00	\$11,725.00	\$11,725.00	\$11,725.00	\$11,725.00	\$11,725.00	\$11,725.00
				\$38,500.00	\$38,500.00	\$38,500.00	\$38,500.00	\$38,500.00	\$38,500.00	\$38,500.00	\$38,500.00	\$38,500.00	\$38,500.00
5	Energy Star Single Room Air Conditioner	\$30.00	\$15.00	\$10,140.00	\$10,140.00	\$10,140.00	\$10,140.00	\$10,140.00	\$10,140.00	\$10,140.00	\$10,140.00	\$10,140.00	\$10,140.00
6	Energy Star Compliant Top Freezer Refrigerator	\$30.00	\$15.00	\$24,630.00	\$24,630.00	\$24,630.00	\$24,630.00	\$24,630.00	\$24,630.00	\$24,630.00	\$24,630.00	\$24,630.00	\$24,630.00
7	Energy Star Compliant Bottom Mount Freezer Refrigerator	\$30.00	\$15.00	\$3,075.00	\$3,075.00	\$3,075.00	\$3,075.00	\$3,075.00	\$3,075.00	\$3,075.00	\$3,075.00	\$3,075.00	\$3,075.00
8	Energy Star Compliant Side-by-Side Refrigerator	\$30.00	\$15.00	\$9,705.00	\$9,705.00	\$9,705.00	\$9,705.00	\$9,705.00	\$9,705.00	\$9,705.00	\$9,705.00	\$9,705.00	\$9,705.00
9	Energy Star Compliant Upright Freezer (Manual Defrost)	\$33.00	\$16.50	\$10,725.00	\$10,725.00	\$10,725.00	\$10,725.00	\$10,725.00	\$10,725.00	\$10,725.00	\$10,725.00	\$10,725.00	\$10,725.00
10	Energy Star Compliant Chest Freezer	\$33.00	\$16.50	\$9,537.00	\$9,537.00	\$9,537.00	\$9,537.00	\$9,537.00	\$9,537.00	\$9,537.00	\$9,537.00	\$9,537.00	\$9,537.00
11	Energy Star Built-In Dishwasher (Electric)	\$50.00	\$25.00	\$39,500.00	\$39,500.00	\$39,500.00	\$39,500.00	\$39,500.00	\$39,500.00	\$39,500.00	\$39,500.00	\$39,500.00	\$39,500.00
12	Energy Star Clothes Washers with Electric Water Heater	\$300.00	\$150.00	\$135,300.00	\$135,300.00	\$135,300.00	\$135,300.00	\$135,300.00	\$135,300.00	\$135,300.00	\$135,300.00	\$135,300.00	\$135,300.00
13	Energy Star Clothes Washers with Non-Electric Water Heater	\$300.00	\$150.00	\$259,200.00	\$259,200.00	\$259,200.00	\$259,200.00	\$259,200.00	\$259,200.00	\$259,200.00	\$259,200.00	\$259,200.00	\$259,200.00
14	Energy Star Dehumidifier (40 pt)	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
				\$501,812.00	\$501,812.00	\$501,812.00	\$501,812.00	\$501,812.00	\$501,812.00	\$501,812.00	\$501,812.00	\$501,812.00	\$501,812.00
15	Standby-Power	\$30.00	\$15.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00
				\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00	\$45,795.00
16	Pool Pump & Motor	\$313.00	\$156.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50
				\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50	\$17,058.50
17	Energy Star Compliant Programmable Thermostat	\$50.00	\$25.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00
				\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00	\$3,375.00
18	High Efficiency Central AC	\$379.00	\$189.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50
				\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50	\$11,559.50
19	CFL's: Homes with partial CFL installation	\$5.00	\$2.00	\$82,494.00	\$82,494.00	\$82,494.00	\$82,494.00	\$82,494.00	\$82,494.00	\$82,494.00	\$82,494.00	\$82,494.00	\$82,494.00
20	CFL's: Homes without CFL installation	\$5.00	\$2.00	\$89,972.00	\$89,972.00	\$89,972.00	\$89,972.00	\$89,972.00	\$89,972.00	\$89,972.00	\$89,972.00	\$89,972.00	\$89,972.00
				\$172,466.00	\$172,466.00	\$172,466.00	\$172,466.00	\$172,466.00	\$172,466.00	\$172,466.00	\$172,466.00	\$172,466.00	\$172,466.00
21	Water Heater Blanket	\$35.00	\$17.50	\$6,300.00	\$6,300.00	\$6,300.00	\$6,300.00	\$6,300.00	\$6,300.00	\$6,300.00	\$6,300.00	\$6,300.00	\$6,300.00
22	Low Flow Shower Head	\$15.00	\$7.50	\$3,135.00	\$3,135.00	\$3,135.00	\$3,135.00	\$3,135.00	\$3,135.00	\$3,135.00	\$3,135.00	\$3,135.00	\$3,135.00
23	Pipe Wrap	\$15.00	\$7.50	\$2,932.50	\$2,932.50	\$2,932.50	\$2,932.50	\$2,932.50	\$2,932.50	\$2,932.50	\$2,932.50	\$2,932.50	\$2,932.50
24	Low Flow Faucet Aerator	\$6.00	\$3.00	\$1,254.00	\$1,254.00	\$1,254.00	\$1,254.00	\$1,254.00	\$1,254.00	\$1,254.00	\$1,254.00	\$1,254.00	\$1,254.00
25	Solar Water Heating	\$4,500.00	\$900.00	\$175,500.00	\$175,500.00	\$175,500.00	\$175,500.00	\$175,500.00	\$175,500.00	\$175,500.00	\$175,500.00	\$175,500.00	\$175,500.00
26	Efficient Water Heating	\$90.00	\$45.00	\$50,040.00	\$50,040.00	\$50,040.00	\$50,040.00	\$50,040.00	\$50,040.00	\$50,040.00	\$50,040.00	\$50,040.00	\$50,040.00
				\$239,161.50	\$239,161.50	\$239,161.50	\$239,161.50	\$239,161.50	\$239,161.50	\$239,161.50	\$239,161.50	\$239,161.50	\$239,161.50
27	Efficient Furnace Fan Motor (Fuel Oil)	\$200.00	\$100.00	\$20,300.00	\$20,300.00	\$20,300.00	\$20,300.00	\$20,300.00	\$20,300.00	\$20,300.00	\$20,300.00	\$20,300.00	\$20,300.00
28	Efficient Furnace Fan Motor (Natural Gas)	\$200.00	\$100.00	\$18,300.00	\$18,300.00	\$18,300.00	\$18,300.00	\$18,300.00	\$18,300.00	\$18,300.00	\$18,300.00	\$18,300.00	\$18,300.00
29	Efficient Furnace Fan Motor (Propane)	\$200.00	\$100.00	\$8,100.00	\$8,100.00	\$8,100.00	\$8,100.00	\$8,100.00	\$8,100.00	\$8,100.00	\$8,100.00	\$8,100.00	\$8,100.00
				\$46,700.00	\$46,700.00	\$46,700.00	\$46,700.00	\$46,700.00	\$46,700.00	\$46,700.00	\$46,700.00	\$46,700.00	\$46,700.00
30	Energy Star Windows - Electric Heat and no AC	\$200.00	\$100.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00
				\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00	\$1,900.00
31	Insulation and Weatherization - Electric Heat and no AC	\$2,000.00	\$1,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00
				\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00	\$3,000.00
Multi Family / Low Income				2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
33	Insulation and Weatherization - Electric Heat and no AC	\$2,000.00	\$2,000.00	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000	\$70,000
				\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00	\$70,000.00
Total for All Programs:				\$1,151,327.50	\$1,151,327.50	\$1,151,327.50	\$1,151,327.50	\$1,151,327.50	\$1,151,327.50	\$1,151,327.50	\$1,151,327.50	\$1,151,327.50	\$1,151,327.50

**Table A-18: Multi Family Incentive Budgets by Year  
Fuel-Switching Programs**

Multi Family		Incremental \$	Incentive \$	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
34	Water Heater-Elec. To Natural Gas (1 Bedroom)	\$500.00	\$250.00	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00	\$3,500.00
35	Water Heater-Elec. To Natural Gas (2 Bedroom)	\$500.00	\$250.00	\$6,000.00	\$6,000.00	\$6,000.00	\$6,000.00	\$6,000.00	\$6,000.00	\$6,000.00	\$6,000.00	\$6,000.00	\$6,000.00
36	Water Heater-Elec. To Natural Gas (3 Bedroom)	\$500.00	\$250.00	\$4,500.00	\$4,500.00	\$4,500.00	\$4,500.00	\$4,500.00	\$4,500.00	\$4,500.00	\$4,500.00	\$4,500.00	\$4,500.00
37	Water Heater-Elec. To Natural Gas (4 Bedroom)	\$500.00	\$250.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00	\$1,000.00
38	Water Heater-Elec. To Natural Gas (5+ Bedroom)	\$500.00	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00	\$250.00
				<b>\$15,250.00</b>	<b>\$15,250.00</b>	<b>\$15,250.00</b>	<b>\$15,250.00</b>	<b>\$15,250.00</b>	<b>\$15,250.00</b>	<b>\$15,250.00</b>	<b>\$15,250.00</b>	<b>\$15,250.00</b>	<b>\$15,250.00</b>
39	Water Heater-Elec. To Fuel Oil (1 Bedroom)	\$1,575.00	\$787.50	\$142,537.50	\$142,537.50	\$142,537.50	\$142,537.50	\$142,537.50	\$142,537.50	\$142,537.50	\$142,537.50	\$142,537.50	\$142,537.50
40	Water Heater-Elec. To Fuel Oil (2 Bedroom)	\$1,575.00	\$787.50	\$249,637.50	\$249,637.50	\$249,637.50	\$249,637.50	\$249,637.50	\$249,637.50	\$249,637.50	\$249,637.50	\$249,637.50	\$249,637.50
41	Water Heater-Elec. To Fuel Oil (3 Bedroom)	\$1,575.00	\$787.50	\$185,850.00	\$185,850.00	\$185,850.00	\$185,850.00	\$185,850.00	\$185,850.00	\$185,850.00	\$185,850.00	\$185,850.00	\$185,850.00
42	Water Heater-Elec. To Fuel Oil (4 Bedroom)	\$1,575.00	\$787.50	\$42,525.00	\$42,525.00	\$42,525.00	\$42,525.00	\$42,525.00	\$42,525.00	\$42,525.00	\$42,525.00	\$42,525.00	\$42,525.00
43	Water Heater-Elec. To Fuel Oil (5+ Bedroom)	\$1,575.00	\$787.50	\$7,087.50	\$7,087.50	\$7,087.50	\$7,087.50	\$7,087.50	\$7,087.50	\$7,087.50	\$7,087.50	\$7,087.50	\$7,087.50
				<b>\$627,637.50</b>	<b>\$627,637.50</b>	<b>\$627,637.50</b>	<b>\$627,637.50</b>	<b>\$627,637.50</b>	<b>\$627,637.50</b>	<b>\$627,637.50</b>	<b>\$627,637.50</b>	<b>\$627,637.50</b>	<b>\$627,637.50</b>
44	Water Heater-Elec. To Propane (1 Bedroom)	\$800.00	\$400.00	\$15,200.00	\$15,200.00	\$15,200.00	\$15,200.00	\$15,200.00	\$15,200.00	\$15,200.00	\$15,200.00	\$15,200.00	\$15,200.00
45	Water Heater-Elec. To Propane (2 Bedroom)	\$800.00	\$400.00	\$26,800.00	\$26,800.00	\$26,800.00	\$26,800.00	\$26,800.00	\$26,800.00	\$26,800.00	\$26,800.00	\$26,800.00	\$26,800.00
46	Water Heater-Elec. To Propane (3 Bedroom)	\$800.00	\$400.00	\$20,000.00	\$20,000.00	\$20,000.00	\$20,000.00	\$20,000.00	\$20,000.00	\$20,000.00	\$20,000.00	\$20,000.00	\$20,000.00
47	Water Heater-Elec. To Propane (4 Bedroom)	\$800.00	\$400.00	\$4,400.00	\$4,400.00	\$4,400.00	\$4,400.00	\$4,400.00	\$4,400.00	\$4,400.00	\$4,400.00	\$4,400.00	\$4,400.00
48	Water Heater-Elec. To Propane (5+ Bedroom)	\$800.00	\$400.00	\$800.00	\$800.00	\$800.00	\$800.00	\$800.00	\$800.00	\$800.00	\$800.00	\$800.00	\$800.00
				<b>\$67,200.00</b>	<b>\$67,200.00</b>	<b>\$67,200.00</b>	<b>\$67,200.00</b>	<b>\$67,200.00</b>	<b>\$67,200.00</b>	<b>\$67,200.00</b>	<b>\$67,200.00</b>	<b>\$67,200.00</b>	<b>\$67,200.00</b>
49	Water Heater-Elec. To Kerosene (1 Bedroom)	\$2,000.00	\$1,000.00	\$38,000.00	\$38,000.00	\$38,000.00	\$38,000.00	\$38,000.00	\$38,000.00	\$38,000.00	\$38,000.00	\$38,000.00	\$38,000.00
50	Water Heater-Elec. To Kerosene (2 Bedroom)	\$2,000.00	\$1,000.00	\$66,000.00	\$66,000.00	\$66,000.00	\$66,000.00	\$66,000.00	\$66,000.00	\$66,000.00	\$66,000.00	\$66,000.00	\$66,000.00
51	Water Heater-Elec. To Kerosene (3 Bedroom)	\$2,000.00	\$1,000.00	\$49,000.00	\$49,000.00	\$49,000.00	\$49,000.00	\$49,000.00	\$49,000.00	\$49,000.00	\$49,000.00	\$49,000.00	\$49,000.00
52	Water Heater-Elec. To Kerosene (4 Bedroom)	\$2,000.00	\$1,000.00	\$11,000.00	\$11,000.00	\$11,000.00	\$11,000.00	\$11,000.00	\$11,000.00	\$11,000.00	\$11,000.00	\$11,000.00	\$11,000.00
53	Water Heater-Elec. To Kerosene (5+ Bedroom)	\$2,000.00	\$1,000.00	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00
				<b>\$166,000.00</b>	<b>\$166,000.00</b>	<b>\$166,000.00</b>	<b>\$166,000.00</b>	<b>\$166,000.00</b>	<b>\$166,000.00</b>	<b>\$166,000.00</b>	<b>\$166,000.00</b>	<b>\$166,000.00</b>	<b>\$166,000.00</b>
54	WH Fuel Switching (Electric to Kerosene- Stand Alone)	\$1,880.00	\$940.00	\$235,000.00	\$235,000.00	\$235,000.00	\$235,000.00	\$235,000.00	\$235,000.00	\$235,000.00	\$235,000.00	\$235,000.00	\$235,000.00
				<b>\$235,000.00</b>	<b>\$235,000.00</b>	<b>\$235,000.00</b>	<b>\$235,000.00</b>	<b>\$235,000.00</b>	<b>\$235,000.00</b>	<b>\$235,000.00</b>	<b>\$235,000.00</b>	<b>\$235,000.00</b>	<b>\$235,000.00</b>
55	WH Fuel Switching (Electric to Wood)	\$1,320.00	\$660.00	\$144,540.00	\$144,540.00	\$144,540.00	\$144,540.00	\$144,540.00	\$144,540.00	\$144,540.00	\$144,540.00	\$144,540.00	\$144,540.00
				<b>\$144,540.00</b>	<b>\$144,540.00</b>	<b>\$144,540.00</b>	<b>\$144,540.00</b>	<b>\$144,540.00</b>	<b>\$144,540.00</b>	<b>\$144,540.00</b>	<b>\$144,540.00</b>	<b>\$144,540.00</b>	<b>\$144,540.00</b>
56	Space Heating (Fuel Switching)	\$6,500.00	\$3,250.00	\$123,500.00	\$123,500.00	\$123,500.00	\$123,500.00	\$123,500.00	\$123,500.00	\$123,500.00	\$123,500.00	\$123,500.00	\$123,500.00
				<b>\$123,500.00</b>	<b>\$123,500.00</b>	<b>\$123,500.00</b>	<b>\$123,500.00</b>	<b>\$123,500.00</b>	<b>\$123,500.00</b>	<b>\$123,500.00</b>	<b>\$123,500.00</b>	<b>\$123,500.00</b>	<b>\$123,500.00</b>
57	Clothes Dryer (Fuel Switching)	\$375.00	\$187.50	\$95,062.50	\$95,062.50	\$95,062.50	\$95,062.50	\$95,062.50	\$95,062.50	\$95,062.50	\$95,062.50	\$95,062.50	\$95,062.50
				<b>\$95,062.50</b>	<b>\$95,062.50</b>	<b>\$95,062.50</b>	<b>\$95,062.50</b>	<b>\$95,062.50</b>	<b>\$95,062.50</b>	<b>\$95,062.50</b>	<b>\$95,062.50</b>	<b>\$95,062.50</b>	<b>\$95,062.50</b>
<b>Total for All Programs:</b>				<b>\$1,474,190.00</b>	<b>\$1,474,190.00</b>	<b>\$1,474,190.00</b>	<b>\$1,474,190.00</b>	<b>\$1,474,190.00</b>	<b>\$1,474,190.00</b>	<b>\$1,474,190.00</b>	<b>\$1,474,190.00</b>	<b>\$1,474,190.00</b>	<b>\$1,474,190.00</b>

Table A-19: Multi Family Total Budgets by Year

Multi Family		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	Refrigerator Turn-in	\$46,179.72	\$46,179.72	\$46,179.72	\$46,179.72	\$46,179.72	\$46,179.72	\$46,179.72	\$46,179.72	\$46,179.72	\$46,179.72
2	Freezer Turn-in	\$6,271.32	\$6,271.32	\$6,271.32	\$6,271.32	\$6,271.32	\$6,271.32	\$6,271.32	\$6,271.32	\$6,271.32	\$6,271.32
3	Room AC Turn-in without Replacement	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55
4	Room AC Turn-in with ES Replacement	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55	\$47,747.55
		\$147,946.14	\$147,946.14	\$147,946.14	\$147,946.14	\$147,946.14	\$147,946.14	\$147,946.14	\$147,946.14	\$147,946.14	\$147,946.14
5	Energy Star Single Room Air Conditioner	\$12,034.69	\$12,034.69	\$12,034.69	\$12,034.69	\$12,034.69	\$12,034.69	\$12,034.69	\$12,034.69	\$12,034.69	\$12,034.69
6	Energy Star Compliant Top Freezer Refrigerator	\$32,997.63	\$32,997.63	\$32,997.63	\$32,997.63	\$32,997.63	\$32,997.63	\$32,997.63	\$32,997.63	\$32,997.63	\$32,997.63
7	Energy Star Compliant Bottom Mount Freezer Refrigerator	\$4,211.09	\$4,211.09	\$4,211.09	\$4,211.09	\$4,211.09	\$4,211.09	\$4,211.09	\$4,211.09	\$4,211.09	\$4,211.09
8	Energy Star Compliant Side-by-Side Refrigerator	\$13,620.32	\$13,620.32	\$13,620.32	\$13,620.32	\$13,620.32	\$13,620.32	\$13,620.32	\$13,620.32	\$13,620.32	\$13,620.32
9	Energy Star Compliant Upright Freezer (Manual Defrost)	\$13,002.28	\$13,002.28	\$13,002.28	\$13,002.28	\$13,002.28	\$13,002.28	\$13,002.28	\$13,002.28	\$13,002.28	\$13,002.28
10	Energy Star Compliant Chest Freezer	\$11,451.57	\$11,451.57	\$11,451.57	\$11,451.57	\$11,451.57	\$11,451.57	\$11,451.57	\$11,451.57	\$11,451.57	\$11,451.57
11	Energy Star Built-In Dishwasher (Electric)	\$46,746.51	\$46,746.51	\$46,746.51	\$46,746.51	\$46,746.51	\$46,746.51	\$46,746.51	\$46,746.51	\$46,746.51	\$46,746.51
12	Energy Star Clothes Washers with Electric Water Heater	\$141,505.40	\$141,505.40	\$141,505.40	\$141,505.40	\$141,505.40	\$141,505.40	\$141,505.40	\$141,505.40	\$141,505.40	\$141,505.40
13	Energy Star Clothes Washers with Non-Electric Water Heater	\$262,392.13	\$262,392.13	\$262,392.13	\$262,392.13	\$262,392.13	\$262,392.13	\$262,392.13	\$262,392.13	\$262,392.13	\$262,392.13
14	Energy Star Dehumidifier (40 pt)	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39	\$9,532.39
		\$547,494.01	\$547,494.01	\$547,494.01	\$547,494.01	\$547,494.01	\$547,494.01	\$547,494.01	\$547,494.01	\$547,494.01	\$547,494.01
15	Standby-Power	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17
		\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17	\$97,331.17
16	Pool Pump & Motor	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50
		\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50	\$21,467.50
17	Energy Star Compliant Programmable Thermostat	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45
		\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45	\$5,920.45
18	High Efficiency Central AC	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90
		\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90	\$12,769.90
19	CFL's: Homes with partial CFL installation	\$311,002.38	\$311,002.38	\$311,002.38	\$311,002.38	\$311,002.38	\$311,002.38	\$311,002.38	\$311,002.38	\$311,002.38	\$311,002.38
20	CFL's: Homes without CFL installation	\$339,194.44	\$339,194.44	\$339,194.44	\$339,194.44	\$339,194.44	\$339,194.44	\$339,194.44	\$339,194.44	\$339,194.44	\$339,194.44
		\$650,196.82	\$650,196.82	\$650,196.82	\$650,196.82	\$650,196.82	\$650,196.82	\$650,196.82	\$650,196.82	\$650,196.82	\$650,196.82
21	Water Heater Blanket	\$12,033.00	\$12,033.00	\$12,033.00	\$12,033.00	\$12,033.00	\$12,033.00	\$12,033.00	\$12,033.00	\$12,033.00	\$12,033.00
22	Low Flow Shower Head	\$12,188.04	\$12,188.04	\$12,188.04	\$12,188.04	\$12,188.04	\$12,188.04	\$12,188.04	\$12,188.04	\$12,188.04	\$12,188.04
23	Pipe Wrap	\$3,754.42	\$3,754.42	\$3,754.42	\$3,754.42	\$3,754.42	\$3,754.42	\$3,754.42	\$3,754.42	\$3,754.42	\$3,754.42
24	Low Flow Faucet Aerator	\$2,771.72	\$2,771.72	\$2,771.72	\$2,771.72	\$2,771.72	\$2,771.72	\$2,771.72	\$2,771.72	\$2,771.72	\$2,771.72
25	Solar Water Heating	\$196,181.80	\$196,181.80	\$196,181.80	\$196,181.80	\$196,181.80	\$196,181.80	\$196,181.80	\$196,181.80	\$196,181.80	\$196,181.80
26	Efficient Water Heating	\$73,132.01	\$73,132.01	\$73,132.01	\$73,132.01	\$73,132.01	\$73,132.01	\$73,132.01	\$73,132.01	\$73,132.01	\$73,132.01
		\$300,060.99	\$300,060.99	\$300,060.99	\$300,060.99	\$300,060.99	\$300,060.99	\$300,060.99	\$300,060.99	\$300,060.99	\$300,060.99
27	Efficient Furnace Fan Motor (Fuel Oil)	\$26,274.17	\$26,274.17	\$26,274.17	\$26,274.17	\$26,274.17	\$26,274.17	\$26,274.17	\$26,274.17	\$26,274.17	\$26,274.17
28	Efficient Furnace Fan Motor (Natural Gas)	\$23,685.58	\$23,685.58	\$23,685.58	\$23,685.58	\$23,685.58	\$23,685.58	\$23,685.58	\$23,685.58	\$23,685.58	\$23,685.58
29	Efficient Furnace Fan Motor (Propane)	\$10,483.78	\$10,483.78	\$10,483.78	\$10,483.78	\$10,483.78	\$10,483.78	\$10,483.78	\$10,483.78	\$10,483.78	\$10,483.78
		\$60,443.53	\$60,443.53	\$60,443.53	\$60,443.53	\$60,443.53	\$60,443.53	\$60,443.53	\$60,443.53	\$60,443.53	\$60,443.53
30	Energy Star Windows - Electric Heat and no AC	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00
		\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00	\$16,416.00
31	Insulation and Weatherization - Electric Heat and no AC	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40
		\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40	\$5,750.40
Multi Family / Low Income		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
33	Insulation and Weatherization - Electric Heat and no AC	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00
		\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00	\$102,088.00
Total for All Programs:		\$1,967,884.90	\$1,967,884.90	\$1,967,884.90	\$1,967,884.90	\$1,967,884.90	\$1,967,884.90	\$1,967,884.90	\$1,967,884.90	\$1,967,884.90	\$1,967,884.90

**Table A-20: Multi Family Total Budgets by Year  
Fuel-Switching Programs**

Multi Family		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
34	Water Heater-Elec. To Natural Gas (1 Bedroom)	\$5,640.32	\$5,640.32	\$5,640.32	\$5,640.32	\$5,640.32	\$5,640.32	\$5,640.32	\$5,640.32	\$5,640.32	\$5,640.32
35	Water Heater-Elec. To Natural Gas (2 Bedroom)	\$10,586.40	\$10,586.40	\$10,586.40	\$10,586.40	\$10,586.40	\$10,586.40	\$10,586.40	\$10,586.40	\$10,586.40	\$10,586.40
36	Water Heater-Elec. To Natural Gas (3 Bedroom)	\$8,627.76	\$8,627.76	\$8,627.76	\$8,627.76	\$8,627.76	\$8,627.76	\$8,627.76	\$8,627.76	\$8,627.76	\$8,627.76
37	Water Heater-Elec. To Natural Gas (4 Bedroom)	\$2,146.60	\$2,146.60	\$2,146.60	\$2,146.60	\$2,146.60	\$2,146.60	\$2,146.60	\$2,146.60	\$2,146.60	\$2,146.60
38	Water Heater-Elec. To Natural Gas (5+ Bedroom)	\$593.98	\$593.98	\$593.98	\$593.98	\$593.98	\$593.98	\$593.98	\$593.98	\$593.98	\$593.98
		<b>\$27,595.06</b>	<b>\$27,595.06</b>	<b>\$27,595.06</b>	<b>\$27,595.06</b>	<b>\$27,595.06</b>	<b>\$27,595.06</b>	<b>\$27,595.06</b>	<b>\$27,595.06</b>	<b>\$27,595.06</b>	<b>\$27,595.06</b>
39	Water Heater-Elec. To Fuel Oil (1 Bedroom)	\$170,208.78	\$170,208.78	\$170,208.78	\$170,208.78	\$170,208.78	\$170,208.78	\$170,208.78	\$170,208.78	\$170,208.78	\$170,208.78
40	Water Heater-Elec. To Fuel Oil (2 Bedroom)	\$310,216.20	\$310,216.20	\$310,216.20	\$310,216.20	\$310,216.20	\$310,216.20	\$310,216.20	\$310,216.20	\$310,216.20	\$310,216.20
41	Water Heater-Elec. To Fuel Oil (3 Bedroom)	\$239,969.52	\$239,969.52	\$239,969.52	\$239,969.52	\$239,969.52	\$239,969.52	\$239,969.52	\$239,969.52	\$239,969.52	\$239,969.52
42	Water Heater-Elec. To Fuel Oil (4 Bedroom)	\$58,004.10	\$58,004.10	\$58,004.10	\$58,004.10	\$58,004.10	\$58,004.10	\$58,004.10	\$58,004.10	\$58,004.10	\$58,004.10
43	Water Heater-Elec. To Fuel Oil (5+ Bedroom)	\$10,183.32	\$10,183.32	\$10,183.32	\$10,183.32	\$10,183.32	\$10,183.32	\$10,183.32	\$10,183.32	\$10,183.32	\$10,183.32
		<b>\$788,581.92</b>	<b>\$788,581.92</b>	<b>\$788,581.92</b>	<b>\$788,581.92</b>	<b>\$788,581.92</b>	<b>\$788,581.92</b>	<b>\$788,581.92</b>	<b>\$788,581.92</b>	<b>\$788,581.92</b>	<b>\$788,581.92</b>
44	Water Heater-Elec. To Propane (1 Bedroom)	\$21,009.44	\$21,009.44	\$21,009.44	\$21,009.44	\$21,009.44	\$21,009.44	\$21,009.44	\$21,009.44	\$21,009.44	\$21,009.44
45	Water Heater-Elec. To Propane (2 Bedroom)	\$39,603.70	\$39,603.70	\$39,603.70	\$39,603.70	\$39,603.70	\$39,603.70	\$39,603.70	\$39,603.70	\$39,603.70	\$39,603.70
46	Water Heater-Elec. To Propane (3 Bedroom)	\$31,466.00	\$31,466.00	\$31,466.00	\$31,466.00	\$31,466.00	\$31,466.00	\$31,466.00	\$31,466.00	\$31,466.00	\$31,466.00
47	Water Heater-Elec. To Propane (4 Bedroom)	\$7,553.15	\$7,553.15	\$7,553.15	\$7,553.15	\$7,553.15	\$7,553.15	\$7,553.15	\$7,553.15	\$7,553.15	\$7,553.15
48	Water Heater-Elec. To Propane (5+ Bedroom)	\$1,487.96	\$1,487.96	\$1,487.96	\$1,487.96	\$1,487.96	\$1,487.96	\$1,487.96	\$1,487.96	\$1,487.96	\$1,487.96
		<b>\$101,120.25</b>	<b>\$101,120.25</b>	<b>\$101,120.25</b>	<b>\$101,120.25</b>	<b>\$101,120.25</b>	<b>\$101,120.25</b>	<b>\$101,120.25</b>	<b>\$101,120.25</b>	<b>\$101,120.25</b>	<b>\$101,120.25</b>
49	Water Heater-Elec. To Kerosene (1 Bedroom)	\$43,809.44	\$43,809.44	\$43,809.44	\$43,809.44	\$43,809.44	\$43,809.44	\$43,809.44	\$43,809.44	\$43,809.44	\$43,809.44
50	Water Heater-Elec. To Kerosene (2 Bedroom)	\$78,612.60	\$78,612.60	\$78,612.60	\$78,612.60	\$78,612.60	\$78,612.60	\$78,612.60	\$78,612.60	\$78,612.60	\$78,612.60
51	Water Heater-Elec. To Kerosene (3 Bedroom)	\$60,236.68	\$60,236.68	\$60,236.68	\$60,236.68	\$60,236.68	\$60,236.68	\$60,236.68	\$60,236.68	\$60,236.68	\$60,236.68
52	Water Heater-Elec. To Kerosene (4 Bedroom)	\$14,153.15	\$14,153.15	\$14,153.15	\$14,153.15	\$14,153.15	\$14,153.15	\$14,153.15	\$14,153.15	\$14,153.15	\$14,153.15
53	Water Heater-Elec. To Kerosene (5+ Bedroom)	\$2,687.96	\$2,687.96	\$2,687.96	\$2,687.96	\$2,687.96	\$2,687.96	\$2,687.96	\$2,687.96	\$2,687.96	\$2,687.96
		<b>\$199,499.83</b>	<b>\$199,499.83</b>	<b>\$199,499.83</b>	<b>\$199,499.83</b>	<b>\$199,499.83</b>	<b>\$199,499.83</b>	<b>\$199,499.83</b>	<b>\$199,499.83</b>	<b>\$199,499.83</b>	<b>\$199,499.83</b>
54	WH Fuel Switching (Electric to Kerosene- Stand Alone)	\$275,198.20	\$275,198.20	\$275,198.20	\$275,198.20	\$275,198.20	\$275,198.20	\$275,198.20	\$275,198.20	\$275,198.20	\$275,198.20
		<b>\$275,198.20</b>	<b>\$275,198.20</b>	<b>\$275,198.20</b>	<b>\$275,198.20</b>	<b>\$275,198.20</b>	<b>\$275,198.20</b>	<b>\$275,198.20</b>	<b>\$275,198.20</b>	<b>\$275,198.20</b>	<b>\$275,198.20</b>
55	WH Fuel Switching (Electric to Wood)	\$179,753.63	\$179,753.63	\$179,753.63	\$179,753.63	\$179,753.63	\$179,753.63	\$179,753.63	\$179,753.63	\$179,753.63	\$179,753.63
		<b>\$179,753.63</b>	<b>\$179,753.63</b>	<b>\$179,753.63</b>	<b>\$179,753.63</b>	<b>\$179,753.63</b>	<b>\$179,753.63</b>	<b>\$179,753.63</b>	<b>\$179,753.63</b>	<b>\$179,753.63</b>	<b>\$179,753.63</b>
56	Space Heating (Fuel Switching)	\$239,628.00	\$239,628.00	\$239,628.00	\$239,628.00	\$239,628.00	\$239,628.00	\$239,628.00	\$239,628.00	\$239,628.00	\$239,628.00
		<b>\$239,628.00</b>	<b>\$239,628.00</b>	<b>\$239,628.00</b>	<b>\$239,628.00</b>	<b>\$239,628.00</b>	<b>\$239,628.00</b>	<b>\$239,628.00</b>	<b>\$239,628.00</b>	<b>\$239,628.00</b>	<b>\$239,628.00</b>
57	Clothes Dryer (Fuel Switching)	\$125,485.24	\$125,485.24	\$125,485.24	\$125,485.24	\$125,485.24	\$125,485.24	\$125,485.24	\$125,485.24	\$125,485.24	\$125,485.24
		<b>\$125,485.24</b>	<b>\$125,485.24</b>	<b>\$125,485.24</b>	<b>\$125,485.24</b>	<b>\$125,485.24</b>	<b>\$125,485.24</b>	<b>\$125,485.24</b>	<b>\$125,485.24</b>	<b>\$125,485.24</b>	<b>\$125,485.24</b>
Total for All Programs:		<b>\$1,936,862.13</b>	<b>\$1,936,862.13</b>	<b>\$1,936,862.13</b>	<b>\$1,936,862.13</b>	<b>\$1,936,862.13</b>	<b>\$1,936,862.13</b>	<b>\$1,936,862.13</b>	<b>\$1,936,862.13</b>	<b>\$1,936,862.13</b>	<b>\$1,936,862.13</b>

## **APPENDIX A-7**

### **Residential Program Participants**

Table A-21: Single Family Program Participants by Year

Single Family		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	Refrigerator Turn-in	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764	1,764
2	Freezer Turn-in	241	241	241	241	241	241	241	241	241	241
3	Room AC Turn-in without Replacement	1,825	1,825	1,825	1,825	1,825	1,825	1,825	1,825	1,825	1,825
4	Room AC Turn-in with ES Replacement	1,825	1,825	1,825	1,825	1,825	1,825	1,825	1,825	1,825	1,825
5	Energy Star Single Room Air Conditioner	3,688	3,688	3,688	3,688	3,688	3,688	3,688	3,688	3,688	3,688
6	Energy Star Compliant Top Freezer Refrigerator	8,949	8,949	8,949	8,949	8,949	8,949	8,949	8,949	8,949	8,949
7	Energy Star Compliant Bottom Mount Freezer Refrigerator	1,116	1,116	1,116	1,116	1,116	1,116	1,116	1,116	1,116	1,116
8	Energy Star Compliant Side-by-Side Refrigerator	3,527	3,527	3,527	3,527	3,527	3,527	3,527	3,527	3,527	3,527
9	Energy Star Compliant Upright Freezer (Manual Defrost)	3,546	3,546	3,546	3,546	3,546	3,546	3,546	3,546	3,546	3,546
10	Energy Star Compliant Chest Freezer	3,150	3,150	3,150	3,150	3,150	3,150	3,150	3,150	3,150	3,150
11	Energy Star Built-In Dishwasher (Electric)	8,612	8,612	8,612	8,612	8,612	8,612	8,612	8,612	8,612	8,612
12	Energy Star Clothes Washers with Electric Water Heater	4,917	4,917	4,917	4,917	4,917	4,917	4,917	4,917	4,917	4,917
13	Energy Star Clothes Washers with Non-Electric Water Heater	9,419	9,419	9,419	9,419	9,419	9,419	9,419	9,419	9,419	9,419
14	Energy Star Dehumidifier (40 pt)	4,714	4,714	4,714	4,714	4,714	4,714	4,714	4,714	4,714	4,714
15	Standby-Power	16,646	16,646	16,646	16,646	16,646	16,646	16,646	16,646	16,646	16,646
16	Pool Pump & Motor	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570	1,570
17	Energy Star Compliant Programmable Thermostat	737	737	737	737	737	737	737	737	737	737
18	High Efficiency Central AC	332	332	332	332	332	332	332	332	332	332
19	CFL's: Homes with partial CFL installation	224,860	224,860	224,860	224,860	224,860	224,860	224,860	224,860	224,860	224,860
20	CFL's: Homes without CFL installation	245,244	245,244	245,244	245,244	245,244	245,244	245,244	245,244	245,244	245,244
21	Water Heater Blanket	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738	1,738
22	Low Flow Shower Head	2,021	2,021	2,021	2,021	2,021	2,021	2,021	2,021	2,021	2,021
23	Pipe Wrap	1,889	1,889	1,889	1,889	1,889	1,889	1,889	1,889	1,889	1,889
24	Low Flow Faucet Aerator	2,021	2,021	2,021	2,021	2,021	2,021	2,021	2,021	2,021	2,021
25	Solar Water Heating	944	944	944	944	944	944	944	944	944	944
26	Efficient Water Heating	5,379	5,379	5,379	5,379	5,379	5,379	5,379	5,379	5,379	5,379
27	Efficient Furnace Fan Motor (Fuel Oil)	1,768	1,768	1,768	1,768	1,768	1,768	1,768	1,768	1,768	1,768
28	Efficient Furnace Fan Motor (Natural Gas)	373	373	373	373	373	373	373	373	373	373
29	Efficient Furnace Fan Motor (Propane)	511	511	511	511	511	511	511	511	511	511
30	Energy Star Windows - Electric Heat and no AC	102	102	102	102	102	102	102	102	102	102
31	Insulation and Weatherization - Electric Heat and no AC	18	18	18	18	18	18	18	18	18	18
32	Residential New Construction	766	943	1120	1297	1474	1651	1828	2005	2182	2358
Single Family / Low Income		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
33	Insulation and Weatherization - Electric Heat and no AC	35	35	35	35	35	35	35	35	35	35

**Table A-22: Single Family Program Participants by Year  
Fuel Switching Programs**

Single Family		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
34	Water Heater-Elec. To Natural Gas (1 Bedroom)	10	10	10	10	10	10	10	10	10	10
35	Water Heater-Elec. To Natural Gas (2 Bedroom)	58	58	58	58	58	58	58	58	58	58
36	Water Heater-Elec. To Natural Gas (3 Bedroom)	139	139	139	139	139	139	139	139	139	139
37	Water Heater-Elec. To Natural Gas (4 Bedroom)	64	64	64	64	64	64	64	64	64	64
38	Water Heater-Elec. To Natural Gas (5+ Bedroom)	19	19	19	19	19	19	19	19	19	19
39	Water Heater-Elec. To Fuel Oil (1 Bedroom)	138	138	138	138	138	138	138	138	138	138
40	Water Heater-Elec. To Fuel Oil (2 Bedroom)	768	768	768	768	768	768	768	768	768	768
41	Water Heater-Elec. To Fuel Oil (3 Bedroom)	1,843	1,843	1,843	1,843	1,843	1,843	1,843	1,843	1,843	1,843
42	Water Heater-Elec. To Fuel Oil (4 Bedroom)	852	852	852	852	852	852	852	852	852	852
43	Water Heater-Elec. To Fuel Oil (5+ Bedroom)	253	253	253	253	253	253	253	253	253	253
44	Water Heater-Elec. To Propane (1 Bedroom)	29	29	29	29	29	29	29	29	29	29
45	Water Heater-Elec. To Propane (2 Bedroom)	162	162	162	162	162	162	162	162	162	162
46	Water Heater-Elec. To Propane (3 Bedroom)	389	389	389	389	389	389	389	389	389	389
47	Water Heater-Elec. To Propane (4 Bedroom)	180	180	180	180	180	180	180	180	180	180
48	Water Heater-Elec. To Propane (5+ Bedroom)	53	53	53	53	53	53	53	53	53	53
49	Water Heater-Elec. To Kerosene (1 Bedroom)	29	29	29	29	29	29	29	29	29	29
50	Water Heater-Elec. To Kerosene (2 Bedroom)	161	161	161	161	161	161	161	161	161	161
51	Water Heater-Elec. To Kerosene (3 Bedroom)	386	386	386	386	386	386	386	386	386	386
52	Water Heater-Elec. To Kerosene (4 Bedroom)	178	178	178	178	178	178	178	178	178	178
53	Water Heater-Elec. To Kerosene (5+ Bedroom)	53	53	53	53	53	53	53	53	53	53
54	WH Fuel Switching (Electric to Kerosene- Stand Alone)	1,210	1,210	1,210	1,210	1,210	1,210	1,210	1,210	1,210	1,210
55	WH Fuel Switching (Electric to Wood)	1,058	1,058	1,058	1,058	1,058	1,058	1,058	1,058	1,058	1,058
56	Space Heating (Fuel Switching)	205	205	205	205	205	205	205	205	205	205
57	Clothes Dryer (Fuel Switching)	2,223	2,223	2,223	2,223	2,223	2,223	2,223	2,223	2,223	2,223



Table A-23: Multi Family Program Participants by Year

Multi Family		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
1	Refrigerator Turn-in	324	324	324	324	324	324	324	324	324	324
2	Freezer Turn-in	44	44	44	44	44	44	44	44	44	44
3	Room AC Turn-in without Replacement	335	335	335	335	335	335	335	335	335	335
4	Room AC Turn-in with ES Replacement	335	335	335	335	335	335	335	335	335	335
5	Energy Star Single Room Air Conditioner	676	676	676	676	676	676	676	676	676	676
6	Energy Star Compliant Top Freezer Refrigerator	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642
7	Energy Star Compliant Bottom Mount Freezer Refrigerator	205	205	205	205	205	205	205	205	205	205
8	Energy Star Compliant Side-by-Side Refrigerator	647	647	647	647	647	647	647	647	647	647
9	Energy Star Compliant Upright Freezer (Manual Defrost)	650	650	650	650	650	650	650	650	650	650
10	Energy Star Compliant Chest Freezer	578	578	578	578	578	578	578	578	578	578
11	Energy Star Built-In Dishwasher (Electric)	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580	1,580
12	Energy Star Clothes Washers with Electric Water Heater	902	902	902	902	902	902	902	902	902	902
13	Energy Star Clothes Washers with Non-Electric Water Heater	1,728	1,728	1,728	1,728	1,728	1,728	1,728	1,728	1,728	1,728
14	Energy Star Dehumidifier (40 pt)	865	865	865	865	865	865	865	865	865	865
15	Standby-Power	3,053	3,053	3,053	3,053	3,053	3,053	3,053	3,053	3,053	3,053
16	Pool Pump & Motor	109	109	109	109	109	109	109	109	109	109
17	Energy Star Compliant Programmable Thermostat	135	135	135	135	135	135	135	135	135	135
18	High Efficiency Central AC	61	61	61	61	61	61	61	61	61	61
19	CFL's: Homes with partial CFL installation	41,247	41,247	41,247	41,247	41,247	41,247	41,247	41,247	41,247	41,247
20	CFL's: Homes without CFL installation	44,986	44,986	44,986	44,986	44,986	44,986	44,986	44,986	44,986	44,986
21	Water Heater Blanket	360	360	360	360	360	360	360	360	360	360
22	Low Flow Shower Head	418	418	418	418	418	418	418	418	418	418
23	Pipe Wrap	391	391	391	391	391	391	391	391	391	391
24	Low Flow Faucet Aerator	418	418	418	418	418	418	418	418	418	418
25	Solar Water Heating	195	195	195	195	195	195	195	195	195	195
26	Efficient Water Heating	1,112	1,112	1,112	1,112	1,112	1,112	1,112	1,112	1,112	1,112
27	Efficient Furnace Fan Motor (Fuel Oil)	203	203	203	203	203	203	203	203	203	203
28	Efficient Furnace Fan Motor (Natural Gas)	183	183	183	183	183	183	183	183	183	183
29	Efficient Furnace Fan Motor (Propane)	81	81	81	81	81	81	81	81	81	81
30	Energy Star Windows - Electric Heat and no AC	19	19	19	19	19	19	19	19	19	19
31	Insulation and Weatherization - Electric Heat and no AC	3	3	3	3	3	3	3	3	3	3
Multi Family / Low Income		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
33	Insulation and Weatherization - Electric Heat and no AC	35	35	35	35	35	35	35	35	35	35

**Table A-24: Multi Family Program Participants by Year  
Fuel-Switching Programs**

Multi Family		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
34	Water Heater-Elec. To Natural Gas (1 Bedroom)	14	14	14	14	14	14	14	14	14	14
35	Water Heater-Elec. To Natural Gas (2 Bedroom)	24	24	24	24	24	24	24	24	24	24
36	Water Heater-Elec. To Natural Gas (3 Bedroom)	18	18	18	18	18	18	18	18	18	18
37	Water Heater-Elec. To Natural Gas (4 Bedroom)	4	4	4	4	4	4	4	4	4	4
38	Water Heater-Elec. To Natural Gas (5+ Bedroom)	1	1	1	1	1	1	1	1	1	1
39	Water Heater-Elec. To Fuel Oil (1 Bedroom)	181	181	181	181	181	181	181	181	181	181
40	Water Heater-Elec. To Fuel Oil (2 Bedroom)	317	317	317	317	317	317	317	317	317	317
41	Water Heater-Elec. To Fuel Oil (3 Bedroom)	236	236	236	236	236	236	236	236	236	236
42	Water Heater-Elec. To Fuel Oil (4 Bedroom)	54	54	54	54	54	54	54	54	54	54
43	Water Heater-Elec. To Fuel Oil (5+ Bedroom)	9	9	9	9	9	9	9	9	9	9
44	Water Heater-Elec. To Propane (1 Bedroom)	38	38	38	38	38	38	38	38	38	38
45	Water Heater-Elec. To Propane (2 Bedroom)	67	67	67	67	67	67	67	67	67	67
46	Water Heater-Elec. To Propane (3 Bedroom)	50	50	50	50	50	50	50	50	50	50
47	Water Heater-Elec. To Propane (4 Bedroom)	11	11	11	11	11	11	11	11	11	11
48	Water Heater-Elec. To Propane (5+ Bedroom)	2	2	2	2	2	2	2	2	2	2
49	Water Heater-Elec. To Kerosene (1 Bedroom)	38	38	38	38	38	38	38	38	38	38
50	Water Heater-Elec. To Kerosene (2 Bedroom)	66	66	66	66	66	66	66	66	66	66
51	Water Heater-Elec. To Kerosene (3 Bedroom)	49	49	49	49	49	49	49	49	49	49
52	Water Heater-Elec. To Kerosene (4 Bedroom)	11	11	11	11	11	11	11	11	11	11
53	Water Heater-Elec. To Kerosene (5+ Bedroom)	2	2	2	2	2	2	2	2	2	2
54	WH Fuel Switching (Electric to Kerosene- Stand Alone)	250	250	250	250	250	250	250	250	250	250
55	WH Fuel Switching (Electric to Wood)	219	219	219	219	219	219	219	219	219	219
56	Space Heating (Fuel Switching)	38	38	38	38	38	38	38	38	38	38
57	Clothes Dryer (Fuel Switching)	507	507	507	507	507	507	507	507	507	507

## **APPENDIX A-8**

### **Residential Measure Descriptions**

## Description of Residential Energy Efficiency Measures

This technical appendix describes a broad range of residential sector energy efficiency measures and programs included in the Vermont Electrical Energy Technical Potential Study.

### 1.1 Appliance Turn-In Program

#### 1.1.1 Description of Measure – Appliance Turn in Program

The two primary goals of an appliance turn in program are:

1. To remove older, secondary freezers and/or refrigerators from customer homes so to prevent these appliances from entering the secondary market.
2. To encourage customers to replace older room air conditioners by providing incentives for new Energy Star qualified room air conditioners.

In other programs conducted in the US, typical incentive amounts for the appliances are \$50 for the refrigerators/freezers, \$25 for customers turning in a room AC and \$35 for those customers turning in a room AC and buying an Energy Star qualified replacement. This type of program has been run in Connecticut, for example, with an overall annual savings of 4,504 MWh.<sup>1</sup> Table A-12 below lists the typical average annual kWh savings for each of these three appliances (room air conditioners, refrigerators, freezers).

Table A-25 – Typical Annual kWh Savings per Appliance from a Turn-In Program

Appliance	Typical Annual kWh Savings Per Appliance from a Turn-In Program <sup>2</sup>
Refrigerator (from turn-in of old unit)	413 kWh
Freezer (from turn-in of old unit)	450 kWh
Room Air Conditioner (without replacement)	40 kWh
Room Air Conditioner (with replacement)	14 kWh

### 1.2 High Efficiency Room Air Conditioners

#### 1.2.1 Description of Measure – High Efficiency Room Air Conditioners

Room air conditioner units are typically mounted in a window so that part of the unit is outside and part is inside. An insulated divider to reduce heat transfer losses typically separates the two sides. The outdoor portion generally includes a

<sup>1</sup> Impact, Process, and Market Study of the Connecticut Appliance Retirement Program: Overall Report. December 23, 2005. Page 4.

<sup>2</sup> Impact, Process, and Market Study of the Connecticut Appliance Retirement Program: Overall Report. December 23, 2005. Nexus Market Research, Inc. & RLW Analytics, Inc. Page 3, Table ES.4

compressor, condenser, condenser fan, fan motor, and capillary tube. The indoor portion generally includes an evaporator and evaporator fan.<sup>3</sup> The key program currently promoting high efficiency room air conditioners is DOE's ENERGY STAR® program. Currently, units with Energy Efficiency Ratios (EERs) of 9.4 to 10.8 (depending on model type and capacity) are eligible for the ENERGY STAR® label. The federal standard for the most popular room air conditioner types and sizes have an EER of 9.7 and 9.8.<sup>4</sup> CEE's Super-Efficient Home Appliance (SEHA) program is defined as the upper end of the ENERGY STAR® spectrum, based on energy efficiency. SEHA promotes room air-conditioners that use 17-38 percent less electricity than the federal minimum.<sup>5</sup> Room air conditioners qualifying for this program have an EER of 10.5 or greater and represent the top 24 percent (in EER) of those models meeting the ENERGY STAR® requirements.

### 1.2.2 Market Barriers

Among the market barriers in this market are lack of consumer awareness of high efficiency equipment and lack of information about this equipment.

### 1.2.3 ENERGY STAR® Room Air Conditioners - Measure Data

**Description** – ENERGY STAR® labeled air conditioners feature high-efficiency compressors, fan motors, and heat transfer surfaces. In an air conditioner, air is cooled when it passes over refrigerant coils, which have fins similar to an automobile radiator. The compressor sends cooled refrigerant through the coils, which draws heat from the air as it is forced over the coils. By using advanced heat transfer technologies, more heat from the air is transferred into the coils than in conventional models, saving energy required to compress the refrigerant. ENERGY STAR labeled room air conditioners must exceed minimum federal standards for energy consumption by at least 10 percent.<sup>6</sup>

**Measure savings** – An Energy Star labeled Single Room A/C Unit saves an average of 44 kWh per year based on climate data specific to Vermont.<sup>7</sup>

**Measure incremental cost** – The comparison between a very high efficiency room air conditioner unit and a conventional unit yields about a \$30 incremental cost.<sup>8</sup>

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<sup>3</sup> Technology Summary. CEE website. [www.cee1.org](http://www.cee1.org)

<sup>4</sup> Products and Specifications, Room Air Conditioners. <http://www.ceeformt.org/resid/seha/seha-spec.php3>

<sup>5</sup> SEHA Specifications on Residential Appliances. <http://www.cee1.org/resid/seha/rm-ac/rm-ac-main.php3>

<sup>6</sup> Energy Star website <http://www.energystar.gov/products/roomac/>.

<sup>7</sup> Savings Calculator-Room Air Conditioners (.xls), found on the EnergyStar website ([www.energystar.gov](http://www.energystar.gov))

<sup>8</sup> *ibid*

**Measure useful life** – The useful life of a high efficiency room air conditioner is 12 years.<sup>9</sup>

**Estimated baseline saturation in Vermont** – Of homes with room air conditioners, the saturation of high efficiency units is estimated to be 32% in the Vermont area.<sup>10</sup>

Table A-26 - Summary of Data Sources for High Efficiency Room AC Technology

Cost of high efficiency room AC	Energy Star website
Cost of standard efficiency room AC	Energy Star website
Energy use of high efficiency room AC	Energy Star website
Energy use of standard efficiency room AC	Energy Star website
Useful life of room AC	Energy Star website
Baseline saturation of high efficiency residential room AC	D&R International
Market barrier information	ACEEE, CEE
National and regional programs	NEEP, MEEA, NEEA

### 1.3 High Efficiency Refrigerators

#### 1.3.1 Description of Measure –High Efficiency Refrigerators

As of July 1, 2001, new federal minimum efficiency standards went into effect that reduced the average energy use of a new refrigerator to approximately 496 kWh per year. This corresponds to a typical 20 cubic foot unit with a top-mounted freezer and no ice-maker. Very high efficiency refrigerators use a number of technologies to achieve energy savings (more efficient compressors, insulation, door seals, etc.). Additional efficiency improvements, however, are possible beyond this new standard.

There are a few variations of high efficiency refrigerator models. There are top freezer models, side by side models, and bottom freezer models. Top freezer models account for 2/3 of refrigeration sales, the side-by-side models are second in sales volume across the U.S., and bottom freezers, although growing in popularity, are still low in sales volume.<sup>11</sup>

#### 1.3.2 Market Barriers

Barriers to improved refrigerator efficiency are several fold, including the useful life of refrigerators of approximately 13 years, limited consumer interest in

<sup>9</sup> Savings Calculator-Room Air Conditioners (.xls), found on the EnergyStar website ([www.energystar.gov](http://www.energystar.gov))

<sup>10</sup> Email exchange with Bill McNary, D&R International. February 22, 2006.

<sup>11</sup> "Refrigerators: Buying Advice", ([www.consumerreports.org](http://www.consumerreports.org))

improved efficiency (due in part to limited understanding of the benefits of high efficiency products), and the fact that many refrigerators are purchased by landlords and builders who care only about purchase price as someone else (home buyers and renters) pay the energy bills. Activities that can address these barriers include improved appliance efficiency labels, increased promotion of the ENERGY STAR® label, and further improvements in federal minimum efficiency standards.

### 1.3.3 ENERGY STAR® Residential Refrigerators - Measure Data

**Description** – The refrigerator is the single biggest power consumer in most households.<sup>12</sup> There are a few different models of refrigerators, the top freezer model accounts for almost 61% of refrigerator sales in the Vermont, with side-by-side models coming in second for sales, and bottom freezers being last.<sup>13</sup>

**Measure savings** – An annual kWh savings of 80 kWh for top freezer models, 95 kWh for side-by-side models, and 87 for bottom freezer models was determined for this analysis.<sup>14</sup>

**Measure incremental cost** – The average incremental costs for an ENERGY STAR® refrigerator over a standard model is \$30.<sup>15</sup>

**Measure useful life** – The useful life of a refrigerator is 13 years.<sup>16</sup>

**Estimated baseline saturation in Vermont** – The saturation of energy efficient refrigerators in Vermont is 11%.<sup>17</sup>

Table A-27 - Summary of Data Sources for High Efficiency Refrigerator Technology

Cost of very high efficiency refrigerator	Energy Star website
Cost of standard refrigerator	Energy Star website
Energy use of high efficiency refrigerator	Energy Star website
Energy use of standard refrigerator	Energy Star website
Useful life of refrigerator	Energy Star website
Baseline saturation of refrigerators	D&R International
Market barrier information	ACEEE, CEE
National and regional programs	NEEP, MEEA, NEEA

<sup>12</sup> Energy Star website. <http://www.energystar.gov/products/refrigerators/>

<sup>13</sup> "Phase 2 Evaluation of the Efficiency Vermont Residential Programs." KEMA, Inc. Dec. 2005. pg 3-20.

<sup>14</sup> Savings Calculator-Residential Refrigerators (.xls), found on the EnergyStar website ([www.energystar.gov](http://www.energystar.gov))

<sup>15</sup> ibid

<sup>16</sup> ibid

<sup>17</sup> Email exchange with Bill McNary, D&R International. February 22, 2006.

## 1.4 High Efficiency Freezers

### 1.4.1 Description of Measure

As with refrigerators, new federal minimum efficiency standards for freezers went into effect in July 2001. The increase in the freezer energy efficiency standard was relatively modest, primarily because the new standards were negotiated between manufacturers and efficiency advocates, resulting in a compromise where high savings were agreed to for high volume products (e.g. top-mount and side-by-side refrigerators) in exchange for modest savings on lower volume products such as freezers. As a result, there is substantial room for improving freezer efficiency.

The energy savings gained in purchasing an energy efficient freezer come from replacing an older model with a newer, more up to date model. Today's freezers are all similar in energy usage; therefore savings between the different models is not an issue.

### 1.4.2 Market Barriers

Freezer sales in the U.S. are relatively modest and largely stagnant. Due to these factors, manufacturers claim that they cannot make the investments needed to improve freezer efficiency and still make a profit. To buttress their claims, they note that following the last increase in freezer efficiency standards, several manufacturers stopped making freezers, leaving only two major manufacturers to serve the North American market. Other barriers to improved freezer efficiency are similar to those discussed previously for refrigerators.

Given the small size of the freezer market and past improvements in freezer efficiency, national energy savings from additional freezer improvements will be modest. Still improvements to the FTC Energy Guide labels may have some impact, as could extension of the ENERGY STAR<sup>®</sup> program to freezers.

### 1.4.3 ENERGY STAR<sup>®</sup> Freezers - Measure Data

**Description** – Freezers account for 5% of residential electricity consumption in the U.S., with more than 33 million households having at least one freezer.<sup>18</sup> Unlike refrigerators that offer several styles to choose from, freezers come in only two styles; Chest and Upright. Chest style models have a door on top that opens upward while Upright models have the door on the front opening outward. The market is split fairly evenly between the two styles. Upright freezers offer the advantage of easier access; you don't have to bend over and reach down into the unit, but tend to be slightly less efficient than chest freezers. In a chest freezer, there is little exchange of hot and cold air, since hot air rises. An upright freezer uses about 25 percent more electricity than a chest model.

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<sup>18</sup> Food Storage/Cooking: Freezers. [www.energyguide.com/library](http://www.energyguide.com/library)



**Measure savings** – A savings of 55 kWh was determined for upright freezer models and a 52 kWh savings was determined for chest freezer models.<sup>19</sup>

**Measure incremental cost** – Incremental costs were found to be about \$33 for all freezer models.<sup>20</sup>

**Measure useful life** – The useful life of a freezer is approximately 11 years.<sup>21</sup>

**Estimated baseline saturation in Vermont** – 12% of all homes with freezers in Vermont currently satisfy Energy Star efficiency requirements.<sup>22</sup>

Table A-28 - Summary of Data Sources for High Efficiency Freezer Technology

Cost of high efficiency freezer	Energy Star website
Cost of standard efficiency freezer	Energy Star website
Energy use of high efficiency freezer	Energy Star website
Energy use of standard efficiency freezer	Energy Star website
Useful life of freezer	Energy Star website
Baseline saturation of freezers	Connecticut Study (GDS)
Market barrier information	ACEEE, CEE
National and regional programs	NEEP, MEEA, NEEA

## 1.5 High Efficiency Dishwashers – Residential Sector

### 1.5.1 Description of Measure

DOE requires dishwasher manufacturers to meet a minimum energy efficiency standard of 2.17 kWh per cycle, equivalent to an energy factor (EF) of 0.46, for residential standard-capacity dishwashers.<sup>23</sup> About 80% of the total energy used by dishwashers goes towards heating the water. So, the best way to improve the efficiency of a dishwasher is to reduce the amount of water needed to clean the dishes. Some dishwashers take advantage of European technology, using a spray system that activates the upper and lower spray arms alternately instead of simultaneously, and thereby reducing water use. A "normal" load for this high efficiency equipment requires 6 gallons of water, instead of 8 to 10 gallons used in competitive models.

<sup>19</sup> Savings Calculator-Residential Freezers (.xls), found on the EnergyStar website ([www.energystar.gov](http://www.energystar.gov))

<sup>20</sup> *ibid*

<sup>21</sup> *ibid*

<sup>22</sup> "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region, Appendix B." June, 2004, by GDS Associates.

<sup>23</sup> Energy Star Program Requirements for Dishwashers, found on the EnergyStar website ([www.energystar.gov](http://www.energystar.gov))

To enable consumers to identify dishwashers that are more efficient, DOE has established voluntary energy efficiency targets for dishwashers (as well as other products) under its ENERGY STAR® program. The program promotes the purchase of highly efficient appliances through product labeling, advertising, sales staff training, and promotional activities. Utilities participating in the program share the costs of promoting ENERGY STAR® products in their service territories. Under the ENERGY STAR® program, however, the efficiency targets for dishwashers have been set at an EF of 0.58. Similar to clothes washers, ENERGY STAR® is raising their efficiency requirements on dishwashers effective January 2007 to an EF of .65. These revised standards will further increase the energy savings of efficient models.<sup>24</sup>

To drive the market toward higher-efficiency targets, CEE also developed the Super Efficient Home Appliance (SEHA) Initiative that will add on to the DOE ENERGY STAR® program. Through this initiative, CEE encourages its members to support both the ENERGY STAR® appliance levels as well as higher efficiency tiers established by CEE. Participants in the initiative will work with retailers, providing information, tools, and incentives to increase the sales of products that qualify for CEE's more aggressive tiers. To avoid sending mixed messages to consumers, the distinction between ENERGY STAR® product levels and CEE levels will be transparent to the consumer. DOE is planning to review the ENERGY STAR® qualifying levels for several products including dishwashers; at this time there is a good chance that the qualifying efficiencies will be raised.

Ultimately, however, customer demand for high efficiency products and ancillary benefits of these products (i.e., low noise, better cleaning, etc.) will drive the market. National and regional market transformation initiatives can play a significant role in spurring consumer demand by promoting consumer awareness and knowledge of efficient dishwashers and their benefits. These educational efforts could be incorporated into current energy education efforts.

Educating consumers about the availability of high efficiency dishwashers, and working with retailers to ensure that they are adequately prepared to market high efficiency dishwashers will be key to successful market transformation efforts. Furthermore, actions to increase the availability and market share of high efficiency dishwashers can influence the new standard.

### 1.5.2 Market Barriers

Among the market barriers in the dishwasher market are lack of consumer awareness of high efficiency equipment and lack of information about this equipment.

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<sup>24</sup> Energy Star Program Requirements for Dishwashers, found on the EnergyStar website ([www.energystar.gov](http://www.energystar.gov))

### 1.5.3 ENERGY STAR® - Measure Data

**Description** –ENERGY STAR® labeled dishwashers save energy by using both improved technology for the primary wash cycle, and by using less hot water to clean. Construction includes more effective washing action, energy efficient motors and other advanced technology such as sensors that determine the length of the wash cycle and the temperature of the water necessary to clean the dishes.<sup>25</sup>

**Measure savings** – Annual savings of an electric heated ENERGY STAR® dishwasher are approximately 72 kWh. ENERGY STAR® dishwashers also save approximately 860 gallons of water annually. All estimates are based on an estimate of 215 cycles per year.<sup>26</sup>

**Measure incremental cost** – The average incremental cost of a high efficiency ENERGY STAR® dishwasher and a standard model is \$50.<sup>27</sup>

**Measure useful life** – The useful life of an Energy Star dishwasher is 10 years.<sup>28</sup>

**Estimated baseline saturation in Vermont** – The saturation of energy efficient dishwashers in the Vermont service area is approximately 21%.<sup>29</sup>

Table A-29 - Summary of Data Sources for High Efficiency Dish Washer Technology

Cost of high efficiency DW	Energy Star website
Cost of standard DW	Energy Star website
Energy use of high efficiency DW	Energy Star website
Energy use of standard DW	Energy Star website
Useful life of DW	Energy Star website
Baseline saturation of DW	D&R International
Market barrier information	ACEEE, CEE
National and regional programs	NEEP, MEEA, NEEA

## 1.6 High Efficiency Clothes Washers

### 1.6.1 Description of Measure

About 84 percent of clothes washers in Vermont are top-loading units that spin on a vertical axis.<sup>30</sup> To wash clothes, the washtub must be filled so that all

<sup>25</sup> Energy Star® website. <http://www.energystar.gov/products/dishwashers/#design>

<sup>26</sup> Savings Calculator-Dishwashers (.xls), found on the EnergyStar website ([www.energystar.gov](http://www.energystar.gov))

<sup>27</sup> ibid

<sup>28</sup> ibid

<sup>29</sup> Email exchange with Bill McNary, D&R International. February 22, 2006.

clothes are covered. In Europe the dominant type of washer is the horizontal axis machine. Horizontal axis machines reduce water use by 50 percent because the washtub is only partially filled. With each rotation of the tub, clothes are dipped in the water at the bottom of the half filled tub. When replacing vertical axis machines that meet the 2006 U.S. energy efficiency standard with H-axis machines, energy use can be reduced by up to 50 percent.<sup>31</sup> Many horizontal axis units are front-loading machines, but some units sold in the US are top loading, consisting of a conventional top loading door with a second door in the rotating metal drum. Additional energy savings can be derived from faster spin speeds. The spin cycle in standard American clothes washers spins clothes at approximately 600 rpm, which reduces the moisture content of the load from 100 percent to approximately 50 to 75 percent (depending on fabric). Typically, this laundry is moved to a dryer, to reduce the moisture content to 2.5 to 5 percent.<sup>32</sup> However, a study by the National Institute of Standards and Technology (NIST) found that to reduce moisture content of a typical laundry load from 70 percent to 40 percent, a spin cycle is approximately 70 times more energy efficient (i.e., requires 1 /70th the energy) than a dryer thermal cycle. For 7 pound loads, increasing the spin speed to 900 rpm reduced dryer energy use by 28 to 47 percent depending on the fabric.<sup>33</sup> Many of the new high-efficiency washers that have recently entered the U.S. market have spin speeds significantly higher than conventional U.S. machines. To reduce wrinkling, these machines typically have complex cycles - slow spin, re-balancing, fast spin, and a final slow spin to ventilate the clothes. High spin speeds are also common in Europe, with many machines having spin speeds over 800 rpm, and some machines operating as high as 1500 rpm.

Studies of horizontal-axis clothes washer performance indicate that these products produce substantial energy savings in the field, not just in the laboratory. In 2000, the U.S. Department of Energy and Maytag Appliances conducted field studies in Reading, Massachusetts. This study was done to assess savings in an urban setting experiencing rapid growth in water and sewer rates. The results were 50 percent energy savings and 44 percent water savings.<sup>34</sup>

In addition to saving water and energy, horizontal-axis machines may offer several other advantages. First, customers who own horizontal-axis washers are highly satisfied with their purchases (e.g. 81 to 95 percent in a study of the

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<sup>30</sup> "Phase 2 Evaluation of the Efficiency Vermont Residential Programs." KEMA, Inc. Dec.2005. pg 3-20.

<sup>31</sup> Partnership for Advancing Technology in Housing. March 10, 2006. ([www.toolbase.org/techinv/](http://www.toolbase.org/techinv/))

<sup>32</sup> An Evaluation of Assigning Credit/Debit to the Energy Factor of Clothes Washers Based On Water Extraction Performance." NBSIR 81-2309. 1981.

<sup>33</sup> *ibid*

<sup>34</sup> E Source Technology Atlas Series, Residential Appliances, section 6.2, "Study Finds Conservation Benefits in Switching to High-Efficiency Appliances," Maytag press release (October 2000), [www.newstream.com](http://www.newstream.com)

Northwest WashWise program).<sup>35</sup> Second, by eliminating the agitator, these units may create less wear and tear on clothes (however, some manufacturers dispute these claims). Third, they may use less detergent than vertical axis machines. This issue is complex and controversial, and may come down to consumer choices about whether they want better cleaning performance than standard machines (in which case there are unlikely to be detergent savings) or whether current cleaning performance is acceptable (in which case there may be some detergent savings). Finally, they are not as prone to load imbalance problems as some vertical axis machines.<sup>36</sup>

The analysis that follows is based on a high-efficiency machine meeting current ENERGY STAR® qualifications. At these performance levels, washer energy use is reduced by greater than 50 percent relative to the average vertical-axis washer now being sold. In addition, substantial savings on water and sewer bills contribute to the economic benefits of high-efficiency washers. ENERGY STAR® is raising their current standards effective January 2007 from a Modified Energy Factor (MEF) of 1.42 to 1.72. These revised ratings will result in even greater energy savings compared to their standard counterparts.<sup>37</sup>

There are currently many on-going efforts to promote high-efficiency washers. The CEE's Residential Clothes Washer Initiative, launched in 1993, promotes the manufacture and sales of energy-efficient clothes washers. CEE has developed a set of specifications and a qualifying product list to define energy efficiency and works with Initiative participants (utilities and energy organizations) to promote qualifying washers through incentive, educational and promotional programs. There are currently more than 50 participating utilities and energy organizations, including Efficiency Vermont. Today, hundreds of different high efficiency models are available in leading retail outlets across the country. Every major domestic appliance manufacturer – including Maytag, Frigidaire, Whirlpool and General Electric – has introduced at least one high-efficiency clothes washer to the market. In addition, DOE is sponsoring an ENERGY STAR® marketing and promotion program that awards an ENERGY STAR® label to washers that meet the CEE efficiency thresholds.

### 1.6.2 Market Barriers

All new washing machines must display EnergyGuide labels to help consumers compare energy efficiency. The EnergyGuide label for clothes washers is based on estimated energy use for 392 loads of laundry per year. This value does not

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<sup>35</sup> "Coming Clean About Resource Efficient Clothes Washers: An Initial WashWise Program and Market Progress Report." Pacific Energy Associates. January 1998.

<sup>36</sup> Lebot, B. et al. "Horizontal Access Domestic Clothes Washers: An Alternative Technology That Can Reduce Residential Energy and Water Use." Proceedings from the ACEEE's 1990 Summer Study on Energy Efficiency in Buildings. 1990. 1.148-1.155.

<sup>37</sup> Energy Star Program Requirements for Clothes Washers, found on the EnergyStar website ([www.energystar.gov](http://www.energystar.gov))

take into account the variations in tub size and other factors. Top loading machines with smaller tubs may have a better rating, but might mean you have to run the machine more often. While high-efficiency washers have many benefits, there may be some limitations. First, most of the current high-efficiency units are front-loading machines. Consumers are used to top-loading machines and it is unclear what proportion of consumers will be averse to front-loaders. Second, some high-efficiency machines have longer cycle times than conventional machines. Third, high-efficiency machines currently sell at a significant cost premium (approximately \$300) relative to conventional machines.<sup>38</sup> While prices are likely to come down in the future, the cost increment is likely to be significant (e.g. several knowledgeable industry experts have suggested a long-term incremental cost in mass production of approximately \$175).

### 1.6.3 ENERGY STAR® Clothes Washers - Measure Data

**Description** – Clothes washers come in two main designs, horizontal-axis (often front-loading) and the conventional vertical axis model. Some new top-loading, horizontal-axis designs use much less water to clean clothes and numerous studies show they clean clothes better than vertical-axis models.

**Measure savings** – Energy savings for an ENERGY STAR® clothes washer for residential applications are between 29-108 kWh per year, depending on whether the water heater is gas or electric powered. Given the many different models, offering different features, the number will vary with the options needed or chosen. In addition, both machines save approximately 7056 gallons of water per year, while the gas-powered clothes washer adds 1.2 mmbtus in natural gas savings. All estimates are based on either 379 or 392 loads per year.<sup>39</sup>

**Measure incremental cost** – The incremental cost of this equipment is about \$300.00.<sup>40</sup>

**Measure useful life** – The useful life of a high efficiency clothes washer is 11 years.<sup>41</sup>

**Estimated baseline saturation in Vermont** - The current saturation of high efficiency clothes washers in Vermont is approximately 14% of all clothes washers.<sup>42</sup>

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<sup>38</sup> Savings Calculator-Clothes Washers (.xls), found on the EnergyStar website ([www.energystar.gov](http://www.energystar.gov)) & Efficiency Vermont Residential Master Technical Reference Manual. 2005-37. Page 92.

<sup>39</sup> *ibid*

<sup>40</sup> *ibid*

<sup>41</sup> *ibid*

<sup>42</sup> Email exchange with Bill McNary, D&R International. February 22, 2006.

Table A-30 - Market Penetration of High Efficiency Clothes Washers

New England	16% <sup>43</sup>
California	17.9% <sup>44</sup>
New York	21% <sup>45</sup>
Vermont	14%
National Penetration Rate	10.5% <sup>46</sup>

Table A-31 - Summary of Data Sources for High Efficiency Clothes Washer Technology

Cost of high efficiency CW	EnergyStar website
Cost of standard CW	EnergyStar website
Energy use of high efficiency CW	EnergyStar website
Energy use of standard CW	EnergyStar website
Useful life of CW	EnergyStar website
Baseline saturation of CW	D&R International
Market barrier information	ACEEE, CEE
National and regional programs	NEEP, MEEA, NEEA

## 1.7 Dehumidifiers

### 1.7.1 Description of Measure - Dehumidifiers

Often used in the damp areas of a home, such as basements, dehumidifiers remove moisture from the air to maintain comfort and to limit the growth of mold and mildew. A standard efficiency dehumidifier can use as much electricity as a conventional refrigerator, which consumes more energy than most other products in the home<sup>47</sup>. ENERGY STAR<sup>®</sup> qualified dehumidifiers provide the same features as conventional models— moisture removal, quiet operation, and durability— but they are more energy efficient. ENERGY STAR<sup>®</sup> qualified models have more efficient refrigeration coils, compressors, and fans than conventional models, which means they use less energy to remove moisture. ENERGY STAR<sup>®</sup> qualified dehumidifiers operate at least 10 percent more efficiently than conventional models. Depending on the size of the dehumidifier,

<sup>43</sup> "Clothes Washer Market Assessment. TumbleWash Program Evaluation" October 1999. RLW Analytics.

<sup>44</sup> "2005 California Statewide Residential Lighting and Appliance Efficiency Saturation Study" RLW Analytics. August 2005.

<sup>45</sup> "NYSERDA Electricity and Peak Demand Savings Review for Residential Appliances & Lighting Program. 2001. (Non-public workpaper.)"

<sup>46</sup> "The Residential Clothes Washer Initiative: A Case Study of the Contributions of a Collaborative Effort to Transform a Market" Shel Feldman Management Consulting, Research Into Action Inc., XENERGY, Inc. June 2001.

<sup>47</sup> Dehumidifiers. Northeast Energy Star Lighting and Appliance Initiative website. April 2006. ([www.myenergystar.com/Dehumidifiers.aspx](http://www.myenergystar.com/Dehumidifiers.aspx))

consumers can save up to \$300 on their electricity bills over the 12-year lifetime of an ENERGY STAR<sup>®</sup> qualified unit<sup>48</sup>.

### 1.7.2 Market Barriers

Among the market barriers in this market are a lack of consumer awareness of high efficiency equipment, a lack of information about this equipment, as well as product availability and model variety. Cost does not appear to be a market barrier for high efficiency dehumidifiers.

### 1.7.3 Dehumidifiers - Measure Data

**Description** – This analysis compared replacing a standard 40 pint dehumidifier with a 40 pint ENERGY STAR<sup>®</sup> dehumidifier that is used 6 months out of the year.

**Measure savings** – An ENERGY STAR<sup>®</sup> labeled dehumidifier saves an average of 173 kWh per year.<sup>49</sup>

**Measure incremental cost** – According to ENERGY STAR<sup>®</sup> there is no incremental between a standard and high efficiency dehumidifier.<sup>50</sup>

**Measure useful life** – According to ACEEE, the useful life of an ENERGY STAR<sup>®</sup> labeled dehumidifier is 12 years.<sup>51</sup>

**Estimated baseline saturation in Vermont** – The saturation of ENERGY STAR<sup>®</sup> labeled dehumidifiers in homes that operate dehumidifiers is estimated to be 2.5%.<sup>52</sup>

Table A-32 - Summary of Data Sources for Dehumidifiers

Cost of high efficiency dehumidifier	Energy Star
Cost of standard dehumidifier	Energy Star
Energy use of high efficiency dehumidifier	Energy Star
Energy use of standard dehumidifier	Energy Star
Useful life of high efficiency dehumidifier	Energy Star
Baseline saturation of high efficiency dehumidifier	MEEA
Market barrier information	ACEEE, CEE
National and regional programs	NEEP, EPA

<sup>48</sup> Dehumidifiers. Northeast Energy Star Lighting and Appliance Initiative website. April 2006. ([www.myenergystar.com/Dehumidifiers.aspx](http://www.myenergystar.com/Dehumidifiers.aspx))

<sup>49</sup> Savings Calculator-Dehumidifiers (.xls), found on the EnergyStar website ([www.energystar.gov](http://www.energystar.gov)).

<sup>50</sup> *ibid.*

<sup>51</sup> *ibid.*

<sup>52</sup> "Illinois Residential Market Analysis, Final Report." Midwest Energy Efficiency Alliance. May 12, 2003. Page. 20.



## 1.8 Standby Power

### 1.8.1 Description of Measure – Standby Power

In homes and offices, electrical equipment consumes some electricity when placed on standby mode or even when switched off. For example, telephone chargers left plugged into a wall socket will continue to draw electricity even after the equipment is fully charged and is not in use, and televisions also continue to draw power after the user switches them off with the remote control. Equipment responsible for standby power waste is present in all sectors: household, services and industry. However, in the household sector, equipment is more generic and easier to target.<sup>53</sup>

In 1999, the International Energy Agency (IEA) proposed that all countries enact energy policies to reduce standby power use to no more than one watt per device by 2010. To date, several countries (including Australia and Korea) have formally adopted the '1-Watt Plan' and other countries (notably Japan and China) have also undertaken strong measures to reduce standby power. In July 2001, President Bush issued an executive order requiring the federal government to purchase products with low standby, with the eventual goal of one-watt or less.<sup>54</sup>

### 1.8.2 Market Barriers

Standby Power appliances, are often replaced not upon burnout, but by changes in technology. Retrofitting solutions, then, are not cost effective compared to low standby power solutions directly incorporated into the design of newer products. As a result, the introduction of newer and more efficient products are dependent upon technological advances more than the useful lives of appliances.

### 1.8.3 Standby Power - Measure Data

**Description** – Standby power is the electricity consumed by end-use electrical equipment that is switched off or not performing its main function. A wide variety of consumer electronics, small household appliances, and office equipment use standby power. The most common sources of standby power consumption include products with remote controls, low-voltage power supplies, rechargeable devices, and continuous digital displays.<sup>55</sup> A typical North American home often contains fifteen to twenty devices constantly drawing standby power.<sup>56</sup>

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<sup>53</sup> "The 1 Watt-Standby Power Initiative: an International Action to Reduce Standby Power Waste of Electrical Equipment" IEA, 2002. ([www.iea.org](http://www.iea.org))

<sup>54</sup> "Reducing Standby Power Waste to Less than 1 Watt: A Relevant Global Strategy That Delivers" IEA, 2002. ([www.iea.org](http://www.iea.org))

<sup>55</sup> Emerging Technologies & Practices. ACEEE 2004. Chapter 6: Measures, Page 40.

<sup>56</sup> "The 1 Watt-Standby Power Initiative: an International Action to Reduce Standby Power Waste of Electrical Equipment" IEA, 2002. ([www.iea.org](http://www.iea.org))

**Measure savings** – Although the amount of standby power consumed by an individual product is relatively small, typically ranging from 0.5 to 30 Watts, the cumulative total is significant given the large number of products involved: an estimated 50 to 70 Watts per household, or 5% of average residential electricity consumption (EIA 2003b; Meier 2002).<sup>57</sup> The savings that can be acquired by replacing 15 devices with models consuming 1-watt or less of standby power is 265 kWh/year.<sup>58</sup>

**Measure incremental cost** – The incremental cost to consumers of consumer electronics and other small home appliances with standby power use of 1W or less is about \$30.<sup>59</sup>

**Measure useful life** – The useful life of consumer electronics using standby power is about 7 years.<sup>60</sup>

**Estimated baseline saturation in Vermont** – Approximately 15% of all homes in the US have at least one product with 1-watt standby.<sup>61</sup>

Table A-33 - Summary of Data Sources for Standby Power

Cost of Standby Power Devices	ACEEE
Energy use of 1-Watt Standby Device	ACEEE
Energy use of standard Device	ACEEE
Useful life of 1-Watt Standby Device	ACEEE
Baseline saturation of 1-Watt Standby Device	ACEEE
Market barrier information	IEA
National programs	IEA

## 1.9 Pool Pump & Motor

### 1.9.1 Description of Measure – Pool Pump & Motor

With regard to pool filtration, quicker is not necessarily better. While large, single speed pool pumps filter pools quickly, they use substantially more energy than multi-speed or small single speed pool pumps and motors. The energy used to operate the cleaning and filtering equipment for a typical pool for one swimming season can equal the energy used to power the average home for the same period of time.<sup>62</sup> Programs offer rebates for high efficiency pool filtration pump and motors as part of a new swimming pool installation or a replacement of the

<sup>57</sup> Emerging Technologies & Practices. ACEEE 2004. Chapter 6: Measures, Page 40.

<sup>58</sup> ibid

<sup>59</sup> ibid

<sup>60</sup> ibid

<sup>61</sup> Email from Jennifer Thorne Amann of ACEEE on March 9, 2006.

<sup>62</sup> Pool Pumps and Motors Factsheet. SMUD. April 2006. (www.smud.org)

standard single-speed filtration pump and motor in an existing swimming pool. Generally, the new pump and motor must be the primary filtration pump and motor assembly of a residential in-ground swimming pool. Above ground pool pumps, booster pumps or spa pumps, do not qualify.<sup>63</sup>

Energy efficient pool pump motors use copper and better magnetic materials to reduce electrical and mechanical losses. As a result, they are longer lasting and more efficient than standard pool pumps. Additionally, high efficiency pumps are much quieter at low speed than standard pumps. High efficiency pumps will also circulate water for a longer period of time, increasing the efficiency of most filter types, automatic chemical dispensers and chlorinators, as well as increasing filter efficiency by decreasing particle impact on most filter types.<sup>64,65</sup>

### 1.9.2 Market Barriers

High efficiency pool pump and motors may not be compatible with all pool equipment such as roof mounted solar heating systems and some pool sweeps. Efficient equipment may not provide adequate circulation if a system utilizes roof mounted solar water heating units, and pressure and suction side pool sweeps may not receive sufficient water flow. Another potential market barrier is the useful life of pool pump and motors in areas where pump and motor use is not year-round. Replacement opportunities are fewer in areas where residential pool use is seasonal compared to areas where pool pump and motor burnout is more frequent due to continued daily operation.

### 1.9.3 Pool Pump & Motor - Measure Data

**Description** – This analysis compared replacing a standard efficiency pool pump and motor utilized for pool filtration and circulation with a high efficiency pool pump and motor.

**Measure savings** – A high efficiency pool pump and motor saves an average of 635 kWh per year.<sup>66</sup>

**Measure incremental cost** – The incremental cost of an efficient pool pump and motor is estimated at \$313.<sup>67</sup>

**Measure useful life** – The useful life of a high efficiency pool pump and motor is 15 years.<sup>68</sup>

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<sup>63</sup> Pool Pumps and Motors Factsheet. SMUD. April 2006. ([www.smud.org](http://www.smud.org))

<sup>64</sup> Multi-Speed Pool Pump Factsheet. PG&E. April 2006 ([www.pge.com](http://www.pge.com))

<sup>65</sup> Pool Pumps and Motors Factsheet. SMUD. April 2006. ([www.smud.org](http://www.smud.org))

<sup>66</sup> "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region, Appendix B." June, 2004, by GDS Associates.

<sup>67</sup> *ibid*

<sup>68</sup> *ibid*

**Estimated baseline saturation in Vermont** – The saturation of homes in Vermont with residential outdoor swimming pools is 11.6%.<sup>69</sup> Of these, approximately 1% is estimated to be operating high efficiency pool pump and motors.<sup>70</sup>

Table A-34 - Summary of Data Sources for Pool Pump & Motor

Cost of high efficiency pool pump & motor	Connecticut Study (GDS)
Cost of standard pool pump & motor	Connecticut Study (GDS)
Energy use of high efficiency pool pump & motor	Connecticut Study (GDS)
Energy use of standard pool pump & motor	Connecticut Study (GDS)
Useful life of high efficiency pool pump & motor	Connecticut Study (GDS)
Baseline saturation of high efficiency pool pump & motor	Connecticut Study (GDS)
Market barrier information	SMUD, PG&E
National and regional programs	SMUD, PG&E, SDG&E

## 1.10 Programmable Thermostats

### 1.10.1 Description of Measure – Programmable Thermostats

Programmable thermostats automatically adjust the home's temperature setting on a set schedule, allowing for daily energy conservation during periods when normal cooling and heating is unnecessary (i.e. when the house is unoccupied or at night). Programmable thermostats can store and repeat multiple daily settings (six or more temperature settings a day) that you can manually override without affecting the rest of the daily or weekly program. However, programmable thermostats have to be set and used properly to deliver the advertised energy savings. Routine deviation from the programmed default settings and schedules can significantly lower actual energy savings.

### 1.10.2 Market Barriers

Among the market barriers in this market are lack of consumer awareness of high efficiency equipment, a high incremental cost and lack of information about this equipment. In addition, energy savings are highly dependent on consumer usage of product and actual savings are sometimes negligible, creating concerns about the measure's efficacy.

<sup>69</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

<sup>70</sup> "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region, Appendix B." June, 2004, by GDS Associates.

### 1.10.3 Programmable Thermostats - Measure Data

**Description** – Programmable thermostats are ENERGY STAR® qualified in 3 different models. The 7 day model provides the most flexibility, allowing several different daily temperature settings for each day of the week. The 5 + 2 model uses the same temperature control setting for each weekday, and another for the weekends. Finally, the 5-1-1 models are similar to the previous models; with the exception of allowing different schedules for each weekend day.

**Measure savings** – An Energy Star labeled programmable thermostat saves an average of 296 kWh per year based on climate data specific to Vermont.<sup>71</sup>

**Measure incremental cost** – The comparison between a programmable thermostat unit and a conventional unit yields about a \$50 incremental cost.<sup>72</sup>

**Measure useful life** – According to ACEEE, the useful life of a programmable thermostat is 10 years.<sup>73</sup>

**Estimated baseline saturation in Vermont** – The saturation of programmable thermostats is estimated to be 11% in Vermont homes with central air conditioning.<sup>74</sup>

Table A-35 - Summary of Data Sources for Programmable Thermostats

Cost of Programmable Thermostat	Home Depot
Cost of standard Thermostat	Home Depot
Energy use of Programmable Thermostat	National Grid
Energy use of standard Thermostat	Connecticut Study (GDS)
Useful life of Programmable Thermostat	Honeywell
Baseline saturation of Programmable Thermostat	Connecticut Study (GDS)
Market barrier information	ACEEE, CEE
National and regional programs	NEEP, MEEA, NEEA

## 1.11 High Efficiency Central Air Conditioners

### 1.11.1 Description of Measure – High Efficiency Central Air Conditioners

While 4.2 percent of homes in Vermont have central air conditioning, about one-sixth of all the electricity generated in the US is used to air condition buildings.

<sup>71</sup> "2002 DSM Performance Measurement Report" National Grid for the MA Department of Telecommunications and Energy. July 2003.

<sup>72</sup> GDS in store visit to Home Depot. 2005.

<sup>73</sup> Dick Spellman phone call with Honeywell. 2001.

<sup>74</sup> "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region. Appendix B." June, 2004, by GDS Associates

Central air conditioners are more efficient than room air conditioners. In addition, they are out of the way, quiet, and convenient to operate. Today's best air conditioners use 30%–50% less energy to produce the same amount of cooling as air conditioners made in the mid 1970s. Even if an air conditioner is only 10 years old, one may save 20%–40% of cooling energy costs by replacing it with a newer, more efficient model.

The installation of oversized air conditioning units in an effort to avoid problems involving inadequate cooling capacity is common. Oversized units have also been utilized as a method of compensating for potential distribution problems such as uninsulated or leaky ductwork. However, these oversized units also create increased costs and reduced efficiency levels.

A central A/C unit that is too big will cycle on and off much more often spending a greater proportion of time running in an inefficient start-up mode. This results in "blasts" of cold air, reducing efficiency, and increasing stress on components. In addition, moisture removal and interior air mixing are also reduced during short run times.<sup>75</sup> Consequently, oversized air conditioning units can do poor job of lowering the humidity, which is also an important component to comfort. Often, a slightly undersized air conditioner is just as comfortable, if not more, than an oversized air conditioner.

Central air conditioners are rated according to their seasonal energy efficiency ratio (SEER). SEER indicates the relative amount of energy needed to provide a specific cooling output. Many older systems have SEER ratings of 6 or less. The minimum SEER allowed today is 10 for a split system and 9.7 for a single-package system. ENERGY STAR® labeled central air conditioners possess SEER ratings of 12 or greater. Air conditioning equipment with SEER ratings of 14 or greater achieve performance levels greater than 30% savings.

New residential central air conditioner standards went into effect in January 2006. Air conditioners manufactured after January 2006 must achieve a Seasonal Energy Efficiency Ratio (SEER) of 13 or higher. SEER 13 is 30% more efficient than the current minimum SEER of 10. The standard applies only to appliances manufactured after January 23, 2006. Equipment with a rating less than SEER 13 manufactured before this date may still be sold and installed.

#### 1.11.2 Market Barriers

Among the market barriers in this market are lack of consumer awareness of high efficiency equipment, a high incremental cost and lack of information about this equipment. In addition, lengthy useful life, and high initial product costs largely prevent retrofitting before replacement is necessary.

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<sup>75</sup> "How Contractors Really Size Air Conditioning Systems." Presented at the 1996 ACEEE Summer Study on Energy Efficiency in Buildings. American Council for an Energy-Efficient Economy. Washington, D.C.

### 1.11.3 ENERGY STAR® Central Air Conditioners - Measure Data

**Description** – Central air conditioners circulate cool air through a system of supply and return ducts. Supply ducts and registers (i.e., openings in the walls, floors, or ceilings covered by grills) carry cooled air from the air conditioner to the home. This cooled air becomes warmer as it circulates through the home; then it flows back to the central air conditioner through return ducts and registers. This analysis compared savings between the current minimum standard (SEER=13) for operating units and a more efficient commercially available air conditioning unit (SEER=15).

**Measure savings** – An ENERGY STAR® labeled central A/C Unit saves an average of 311.5 kWh per year based on climate data specific to Vermont.<sup>76</sup>

**Measure incremental cost** – The comparison between a very high efficiency central air conditioning unit and a conventional unit yields about a \$379 incremental cost.<sup>77</sup>

**Measure useful life** – The useful life of a central A/C is 18 years.<sup>78</sup>

**Estimated baseline saturation in Vermont** – 4.2% of homes in Vermont have central a/c. The saturation of efficient central air conditioners is estimated to be 24% of homes with central a/c in the Vermont area.<sup>79</sup>

Table A-36 - Summary of Data Sources for Central AC Technology

Cost of high efficiency Central AC	Efficiency Vermont
Cost of standard efficiency Central AC	Efficiency Vermont
Energy use of high efficiency Central AC	Efficiency Vermont
Energy use of standard efficiency Central AC	-
Useful life of Central AC	EVT TRM
Baseline saturation of residential Central AC	KEMA
Market barrier information	ACEEE, CEE
National and regional programs	NEEP, MEEA, NEEA

## 1.12 Residential Lighting - Fluorescent Technologies

### 1.12.1 Description of Measure

Residential fluorescent bulbs and fixtures present a significant opportunity for energy and maintenance savings. On a per lamp basis, compact

<sup>76</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 491.

<sup>77</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 492.

<sup>78</sup> *ibid.*

<sup>79</sup> GDS calculation based on Vermont Residential Appliance Saturation Survey.

fluorescent lamps are generally 70 percent more efficient than incandescent lamps and last up to ten times longer. Poor quality, selection, appearance and reliability of residential fluorescent fixtures have in the past contributed to consumer aversion to fluorescent lighting. Additionally, the lack of brand loyalty among consumers coupled with the large number of manufacturers (500 including foreign companies) led to a proliferation of inferior fluorescent fixtures in the 1990's. According to Calwell et al., the existing stock of residential fixtures in 1996 was approximately 15 percent fluorescent and 85 incandescent,<sup>80</sup> More recent data shows that approximately 20% of existing lighting is fluorescent, suggesting that fluorescent share is increasing, but considerable technical potential for energy savings remains.<sup>81</sup>

In considering possible energy efficiency or market transformation initiatives, the fixture market can and should be separated into two end-use categories: hard-wired and portable units, which differ in both the supply chain and in consumer purchasing patterns. Hard-wired fixtures are most frequently purchased for new construction and major renovations, whereas portable fixtures are most often a retrofit, replacement or remodeling purchase. During recent years, national chain stores such as Home Depot and Lowe's have featured displays of compact fluorescent bulbs and have increased the market share of this technology in homes across the U.S.

Installing hard-wired fluorescent fixtures reduces the likelihood of reversion to incandescent lamps. Consequently, hard-wired fixtures (indoor and outdoor) that are characterized by energy efficiency, quality and safety present a significant opportunity to reduce energy consumption. Since the point-of-sale for hard-wired fixtures is relatively concentrated (and generally limited to showrooms, contractors and distributors), a fixture initiative can target these markets more effectively than lamp suppliers for which sales locations are more diffuse.

In contrast, portable fixtures represent less of an opportunity for market transformation because the target market is diffuse, and influencing purchasing decisions may take considerably more resources. However, new developments in torchiere lamps provide a unique market transformation opportunity. The 40 million halogen torchieres in American homes, dorms and offices consume up to 600 watts of power each, and often account for 30 to 50 percent of lighting retailers' sales.<sup>82</sup> The typical compact fluorescent alternative to halogen torchieres consumes 55 to 100 watts of power, representing an efficiency improvement of 6 times the halogen at full light output. Incandescent torchieres

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<sup>80</sup> Calwell, Chris, Chris Granda, Charlie Stephens and My Ton. 1996. *Energy Efficient Residential Luminaires: Technologies and Strategies for Market Transformation*. Final Report. Submitted to the U.S.E.P.A., Office of Air and Radiation, Energy Star Programs, under grant #CX824685. San Francisco, CA: Natural Resources Defense Council.

<sup>81</sup> "Energy Efficiency Lighting In the Residential Market." Brad Kates and Steve Bonnanno. Powerpoint Presentation, April 2005.

<sup>82</sup> Calwell, Chris, Chris Granda, Charlie Stephens and My Ton. 1996. *Energy Efficient Residential Luminaires: Technologies and Strategies for Market Transformation*. Final Report. Submitted to the U.S.E.P.A., Office of Air and Radiation, Energy Star Programs, under grant #CX824685. San Francisco, CA: Natural Resources Defense Council



are becoming more popular as well, with consumption rates of 100 to 150 watts. In addition, some non-torchiere portable fixtures that use only compact fluorescent lamps are now available.

The costs of residential fluorescent fixtures vary widely. For this analysis of fluorescent and incandescent technologies, a Home Depot store located in Vermont has been used as the primary source of up-to-date cost and wattage data.

#### 1.12.2 Market Barriers – Fluorescent Lighting Technologies

The primary market barriers to the penetration of fluorescent fixtures include product availability, quality of residential grade fixtures, consumer aversion to fluorescent lighting, and the first cost (purchase price) for high quality fixtures and bulbs. For hard-wired fixtures, specifier and commercial grade units are of better quality than residential fixtures. Consequently, making these fixture grades available to homeowners at a reasonable cost is an important market transformation strategy.

Market transformation programs for lighting fixtures exist nationally and regionally. Launched in March of 1997, the ENERGY STAR<sup>®</sup> Fixture program promotes the adoption of high quality, efficient fixtures through its labeling program. Two regional fixture initiatives sponsored by the Northeast Energy Efficiency Partnerships (NEEP) and the Northwest Energy Efficiency Alliance (NEEA) have recently been adopted and several states also fund their own residential lighting programs. Most of these initiatives coordinate with the ENERGY STAR<sup>®</sup> program, targeting both hard-wired and portable fixtures, and encourage active retail promotions and consumer education. Similarly, a coalition of California utilities, coordinating with the Northwest, selected the ENERGY STAR<sup>®</sup> Fixtures specification as the basis of a regional lighting fixture program and plans to offer performance-based incentives to fixture manufacturers, wholesalers, and large and small retailers. In addition to the above market transformation initiatives, another force advancing lighting efficiency is the banning of halogen torchieres by a number of universities due to the fire hazard they pose.<sup>83</sup>

#### 1.12.3 Compact Fluorescent Bulb Measure Data

**Description** – The purchase price of compact fluorescent bulbs (CFLs) most commonly purchased for residential applications is now in the range of \$3-\$5 per bulb. These bulbs can be found in hardware stores as well as in chain stores such as Home Depot and Lowe's. CFL bulbs range in size and shape, and their

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<sup>83</sup> Chris Calwell, "Big Lamp on Campus: An Energy and Environmental Curriculum Module for Colleges Concerned about Halogen Lamp Use," submitted by Ecos Consulting to the US Environmental Protection Agency, Office of Air and Radiation, Energy Star Programs, under Grant # CX820578-01-0 to the Natural Resources Defense Council, April 15, 1997.

appearance can be a spiral shaped fluorescent tube, or they can appear as a standard shape such as the R-30 floodlight for use in recessed cans.

**Measure savings** – Energy savings for a CFL are approximately 75% as compared to a standard incandescent light bulb (for example, a 19 watt compact fluorescent can replace a 75 watt incandescent bulb). For this report, GDS has calculated an average annual energy savings based on different wattages and 986 hours of annual operation. The average annual kilowatt-hour savings associated with installing more CFL bulbs in a home using partial compact fluorescent lighting is approximately 25.97 kWh per year. GDS assumed homes with partial CFL installation had previously installed the efficient bulbs in their most commonly used fixtures. The remaining fixtures, then, are used less frequently and fewer annual hours. Consequently, homes with no prior CFL installation would be able to install efficient lighting in their most commonly used fixtures and would realize greater average savings. Homes with no CFL bulbs presently installed would save an average of 31.164 kWh per year.<sup>84</sup>

**Measure incremental cost** – The incremental purchase price of a CFL at Home Depot/Lowe's in 2006 ranges from \$4.71 to \$12.02. Because lower wattage CFL bulbs are purchased at a greater frequency than higher wattage CFL bulbs (with higher associated incremental costs) a weighted average incremental cost was calculated. The weighted average incremental cost of a CFL bulb (after an estimate effect of multi-pack price savings) used in this analysis is \$5.00.<sup>85</sup>

**Measure useful life** – The useful life of a CFL bulb is approximately 7,500 hours, or 7.6 years.<sup>86</sup>

**Estimated baseline saturation in Vermont** – Based on recent market assessment data collected in Vermont, homes with efficient lighting have an average of 5.9 CFL bulbs (out of 30.5 CFL-compatible sockets), or an estimated saturation of 19.34%. Homes without compact fluorescent lighting have an estimated saturation of 0% for this efficiency measure.<sup>87</sup>

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<sup>84</sup> GDS calculation from Efficiency Maine Residential Lighting Program (2003-2005)

<sup>85</sup> *ibid*

<sup>86</sup> Manufacturer data

<sup>87</sup> "Phase 2 Evaluation of the Efficiency Vermont Residential Programs." KEMA, Inc. December 2005, Pages 1-23.

Table A-37 - Summary of Data Sources for CFL Technology

Cost of CFL bulb	Home Depot store
Cost of incandescent bulb	Home Depot store
Energy use of CFL bulb	GDS Calculation
Energy use of incandescent bulb	GDS Calculation
Useful life of CFL bulb	Manufacturer data on product package
Useful life of incandescent bulb	Manufacturer data on product package
Baseline saturation of CFL bulbs	KEMA, Inc., December 2005 Market Assessment Report
Baseline saturation of incandescent bulbs	KEMA, Inc., December 2005 Market Assessment Report
Market barrier information	ACEEE, CEE
National and regional programs	ACEEE, CEE, NEEP, NEEA, MEEA

### 1.13 High Efficiency Water Heaters & Water Heater Efficiency Options

#### 1.13.1 Measure Description

The average standard efficiency stand alone electric water heater sold today has an Energy Factor (EF) of approximately 0.87. Higher efficiency models are available with thicker insulation (up to 3 inches thick) and with heat traps, which limit heat losses through inlet and outlet pipes. These models most commonly have an EF of 0.93. These efficiency values particularly apply to the 50 to 55 gallon size class, which represents a majority of all electric water heater sales. Energy savings with high efficiency water tanks are essentially all in reduced standby losses.

In addition to the traditional stand alone storage tank water heaters, heat pump water heaters are also commercially available. Heat pumps, commonly used for space heating purposes, can also apply the principle of transferring heat from surrounding air and deliver it to water. Some models comes as a complete package including tank and back-up resistance heating elements while others work as an accessory to a conventional water heater.

As this unit extracts heat from the surrounding air (indoor, exhaust, or outdoor air), a heat pump water heater delivers about twice the heat for the same electricity costs as a conventional stand alone water heater.<sup>88</sup> In addition, the transfer of heat from neighboring air also serves to cool and dehumidify a space, creating additional benefits during the cooling season, but drawbacks during the heating season. In recent years, the market for heat pump water heating systems has been stagnant due to competition with gas waters heaters enjoying

<sup>88</sup> "Heat Pump Water Heaters-Residential" Energy Efficiency Factsheet, Washington State University Energy Program. Accessed April 2006. ([www.energy.wsu.edu](http://www.energy.wsu.edu))

favorable gas prices and the failure of electric rates to rise as fast as initially projected in many areas.<sup>89</sup>

While most water heater systems are stand-alone systems, they can also be integrated with the boiler used to heat the home. There are two styles of integrated systems; Tankless Coil and Indirect. Tankless Coil systems heat water as it is needed just as a demand system, the only difference being that the boiler is used to heat the water. Indirect systems also heat water in the boiler, but the water is then stored in a tank. The advantage of a tankless coil system is the avoided cost of purchasing a separate water heating system. The disadvantage is that during the non-heating season water heating is inefficient since the heating system must operate solely for heating water.

Indirect systems have the added cost of a tank, but since the hot water is stored in an insulated tank, the boiler or furnace does not have to turn on and off as frequently, improving its fuel economy. This increased efficiency generally offsets the cost of a tank. According to ACEEE, when used in combination with new, high efficiency boilers or furnaces, indirect water heaters are generally the least expensive way to provide hot water.<sup>90</sup> Gas, oil, and propane-fired systems are available.

Although ENERGY STAR does not include water heaters in their label program, utilities in the Northwest, for example, have been promoting high efficiency electric water heaters for many years. The typical program pays incentives of \$25 to \$60 for water heaters with an EF of 0.93 or more. Participation rates of 40 to 60 percent of water heater sales have been achieved.

In lieu of replacing a water heater with a more efficient model, there are several alternative measures that can be used to help in the conservation of water and energy loss within the residential sector. The installation of water heater blankets, pipe wrap, low flow shower heads, and faucet aerators are all energy efficient measures that will save energy and money on an existing water heating system. Other techniques for increasing water heater efficiency is the addition of a solar water heating system as well as fuel-switching, or eliminating electric water heating systems for more efficient non-electric systems.

### 1.13.2 Market Barriers

Among the market barriers in this market are lack of consumer awareness of high efficiency equipment, a long measure useful life, and lack of information about this equipment and the efficiency options.

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<sup>89</sup> "Heat Pump Water Heaters-Residential" Energy Efficiency Factsheet, Washington State University Energy Program. Accessed April 2006. ([www.energy.wsu.edu](http://www.energy.wsu.edu))

<sup>90</sup> "Consumer Guide to Home Energy Savings, 8<sup>th</sup> edition." ACEEE. pg. 100

### 1.13.3 Water Heater Blanket - Measure Data

**Description** – Water heater jackets are designed to wrap around an existing water heater tank to improve insulation, prevent heat loss and save energy. Installing an insulating blanket will reduce standby heat loss - heat lost through the walls of the tank- by 25-40%.<sup>91</sup>

**Measure savings** – Water heater insulation blankets save approximately 250 kWh per year.<sup>92</sup>

**Measure incremental cost** – The incremental cost to consumers of water heater insulation blankets is \$35.<sup>93</sup>

**Measure useful life** – The useful life of a water heater blanket is 7 years.<sup>94</sup>

**Estimated baseline saturation in Vermont** – Approximately 61.6% of all electric water heaters in Vermont have installed an insulation blanket around their water heater.<sup>95</sup>

Table A-38 - Summary of Data Sources for Water Heater Blanket

Cost of installing WH blanket	Efficiency Vermont
Energy use of WH w/ blanket	Efficiency Vermont
Energy use of standard WH	Efficiency Vermont
Useful life of WH blanket	Efficiency Vermont
Baseline saturation of WH blanket	KEMA, Inc.

### 1.13.4 Low Flow Shower Head - Measure Data

**Description** – Low flow showerheads are another measure that is low-cost, and in addition to faucet aerators can reduce home water consumption by as much as 50%.<sup>96</sup>

**Measure savings** – Low flow shower heads can save approximately 340 kWh per year.<sup>97</sup>

<sup>91</sup> "Consumer Guide to Home Energy Savings." 8th ed. ACEEE. 2003. Page 112.

<sup>92</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 367.

<sup>93</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 368.

<sup>94</sup> *ibid.*

<sup>95</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

<sup>96</sup> "Low-Flow Aerators" ([www.eartheasy.com](http://www.eartheasy.com))

<sup>97</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 379.

**Measure incremental cost** – The incremental cost to consumers of low flow shower heads is around \$15.<sup>98</sup>

**Measure useful life** – The useful life of a low flow shower head is 9 years.<sup>99</sup>

**Estimated baseline saturation in Vermont** – Approximately 58.6% of all homes with electric water heaters in Vermont have installed a low flow shower head in their home.<sup>100</sup>

Table A-39 - Summary of Data Sources for Low-Flow Shower Head

Cost of Low-Flow Shower Head	Efficiency Vermont
Energy use of Low-Flow Shower Head	Efficiency Vermont
Energy use of standard Shower Head	Efficiency Vermont
Useful life of Low-Flow Shower Head	Efficiency Vermont
Baseline saturation of Low-Flow Shower Head	KEMA, Inc.

#### 1.13.5 Pipe Wrap - Measure Data

**Description** – Insulating hot water pipes will reduce losses as the hot water is flowing to the faucet and, more importantly, it will reduce standby losses when the tap is turned off and then back on within an hour or so. Pipe wrap will conserve energy and water that would normally be lost waiting for the hot water to reach the tap. Energy loss still occurs after pipe wrap has been installed, though to a smaller degree than the losses observed in non-insulated pipes.

**Measure savings** – Pipe wrapping can save approximately 33 kWh per year.<sup>101</sup>

**Measure incremental cost** – The incremental cost to consumers of water heater pipe-wrap is \$15.<sup>102</sup>

**Measure useful life** – The useful life of a pipe wrap is 13 years.<sup>103</sup>

**Estimated baseline saturation in Vermont** – Approximately 60% of all electric water heaters in Vermont have installed insulation wrap around their hot water pipes.<sup>104</sup>

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<sup>98</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 380.

<sup>99</sup> *ibid.*

<sup>100</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

<sup>101</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 371.

<sup>102</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 372.

<sup>103</sup> *ibid.*

<sup>104</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

Table A-40 - Summary of Data Sources for Water Heater Pipe Wrap

Cost of Pipe Wrap	Efficiency Vermont
Energy use of WH w/ Pipe Wrap	Efficiency Vermont
Energy use of standard WH	Efficiency Vermont
Useful life of Pipe Wrap	Efficiency Vermont
Baseline saturation of Pipe Wrap	GDS

### 1.13.6 Faucet Aerators - Measure Data

**Description** – Faucet aerators are attachments used to increase spray velocity, reduce splash and save water and energy. There are many variations of aerators yet they all should have a water usage of 2.75 gallons or less. These different models include swiveling, dual spray, vandal proof (requires a key to remove) and a one touch on/off tap saver. This model is equipped with a control lever to temporarily reduce the water flow without disturbing the temperature setting. This feature allows you to reduce the flow of water while shaving, brushing teeth, or washing dishes to save water.<sup>105</sup>

**Measure savings** – Faucet aerators can save approximately 57 kWh per year.<sup>106</sup>

**Measure incremental cost** – The incremental cost to consumers of a faucet aerator is \$6.<sup>107</sup>

**Measure useful life** – The useful life of a faucet aerator is 9 years.<sup>108</sup>

**Estimated baseline saturation in Vermont** – Approximately 58.6% of homes in Vermont with electric water heaters have installed faucet aerator to conserve energy.<sup>109</sup>

Table A-41 - Summary of Data Sources for Faucet Aerators

Cost of FA	Efficiency Vermont
Energy use of FA	Efficiency Vermont
Energy use of home without FA	Efficiency Vermont
Useful life of FA	Efficiency Vermont
Baseline saturation of FA	KEMA, Inc.

<sup>105</sup> Faucet Aerators, AM Conservation Group, Inc. ( [www.amconservationgroup.com](http://www.amconservationgroup.com))

<sup>106</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 382.

<sup>107</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 383.

<sup>108</sup> *ibid.*

<sup>109</sup> GDS Calculation based on similar assumptions found in the Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

### 1.13.7 Solar Water Heaters - Measure Data

**Description** – Solar water heaters are designed to serve as pre-heaters for conventional storage or demand water heaters. As the solar system preheats the water, the extra temperature boost required by the storage or demand water heater is relatively low, and high flow rate can be achieved. Although less common than they were two to three decades ago, solar water heating units are considerably less expensive and more reliable.<sup>110</sup> Solar water heaters can be particularly effective if they are designed for three-season use, with a home's heating system providing hot water during the winter months.

**Measure savings** – Solar water heating units save approximately 1,665 kWh per year.<sup>111</sup>

**Measure incremental cost** – The incremental cost per home to consumers of a solar water heating system is \$4,500.<sup>112</sup>

**Measure useful life** – The useful life of a solar water heater is 20 years.<sup>113</sup>

**Estimated baseline saturation in Vermont** – Approximately 0% of all electric water heaters in Vermont are pre-heated with solar power.<sup>114</sup>

Table A42 - Summary of Data Sources for Solar Water Heater Technology

Cost of Solar WH	John Plunkett
Cost of standard WH	Connecticut Study (GDS)
Energy use of Solar WH	Connecticut Study (GDS)
Energy use of standard WH	Connecticut Study (GDS)
Useful life of Solar WH	ACEEE
Baseline saturation of Solar WH	Connecticut Study (GDS)

### 1.13.8 High Efficiency Water Heaters - Measure Data

**Description** – Ranging in size from 20 to 80 gallons (75.7 to 302.8 liters), storage water heaters remain the most popular type for residential heating needs in the United States. A storage heater operates by releasing hot water from the

<sup>110</sup> "Consumer Guide to Home Energy Savings" 8th ed. ACEEE. 2003. Page 101.

<sup>111</sup> "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region, Appendix B." June, 2004, by GDS Associates.

<sup>112</sup> Incremental cost based on estimation given in "Supplemental Findings on GDS Draft Potential Study – Residential Sector" by John Plunkett

<sup>113</sup> "Consumer Guide to Home Energy Savings" 8th ed. Table 6-6. ACEEE. 2003

<sup>114</sup> "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region, Appendix B." June, 2004, by GDS Associates.



top of the tank when the hot water tap is turned on. To replace that hot water, cold water enters the bottom of the tank, ensuring that the tank is always full.<sup>115</sup>

**Measure savings** – Based on the DOE test procedure, energy savings associated with the switch from 0.87 EF to a 0.93 EF tank are approximately 326 kWh annually per high efficiency water heater installed.<sup>116</sup>

**Measure incremental cost** – The incremental cost to consumers of high efficiency electric water heaters is \$90.<sup>117</sup>

**Measure useful life** – The useful life of an electric water heater is 13 years.<sup>118</sup>

**Estimated baseline saturation in Vermont** – Approximately 6% of all electric water heaters in Vermont can currently be classified as energy efficient.<sup>119</sup>

Table A-43 - Summary of Data Sources for High Efficiency Water Heater Technology

Cost of high efficiency WH	ACEEE
Cost of standard WH	ACEEE
Energy use of high efficiency WH	DOE
Energy use of standard WH	DOE
Useful life of WH	ACEEE
Baseline saturation of WH	Connecticut Study (GDS)
Market barrier information	ACEEE, CEE
National and regional programs	NEEP, MEEA, NEEA

## 1.14 Efficient Furnace Fan Motors

### 1.14.1 Description of Measure – Efficient Furnace Fan Motors

In general, a forced-air furnace is a relatively simple device, similar to a gas oven that's hooked up to a fan. First, natural gas is piped to a burner inside a combustion chamber where the gas is mixed with air and ignited by a pilot light, a spark or a related device at the request of a thermostat. Next, a blower in the furnace pulls cool air in from rooms through air ducts, passes it through a metal "heat exchanger" where it's heated by the burner, and blows the warm air back

<sup>115</sup> U.S. Department of Energy website <http://www.eren.doe.gov/erec/factsheets/watheath.html>

<sup>116</sup> Energy calculations based on DOE energy assumptions.

<sup>117</sup> "Consumer Guide to Home Energy Savings" 8th ed. Table 6-6. ACEEE. 2003.

<sup>118</sup> *ibid.*

<sup>119</sup> "Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region, Appendix B." June, 2004, by GDS Associates.

into rooms through ductwork. Finally, exhaust gasses from the burners are vented outside through a flue.<sup>120</sup>

Over the past several years, manufacturers have used several new technologies to boost efficiency. One advancement was the move from the standing pilot light -- which burns gas even when the furnace is dormant -- to electronic spark ignition that fires the furnace on demand. Yet another step forward is "hot surface ignition," a method said to be more reliable than the electronic spark. Rather than using a spark plug that can corrode, it ignites the gas mixture with a coil that glows white hot.

Many gas-fired, high-efficiency furnaces also save on the electricity required to power the fan. They can do this by coupling a sophisticated, programmable thermostat to a variable-speed motor. Unlike a conventional system, where the furnace goes on, blows hot air into the house at full force for a few minutes, then shuts off, a variable-speed or "variable capacity" system runs the blower for longer periods at lower speeds. It provides more even, quiet, comfortable heat than a conventional furnace and doesn't consume electricity unnecessarily because it rarely runs at full speed<sup>121</sup>.

#### 1.14.2 Market Barriers

Furnace fan energy use, which is disclosed in public databases, is not regulated so little attention is generally paid to it. As a result, although attention to efficiency can save consumers money in life cycle costs, few have a firm understanding of the benefits. Additionally, in a retrofit market, dealer training and experience, stocking practices and availability, and related factors have limited the willingness of many dealers to recommend the higher price but more efficient products.

#### 1.14.3 Efficient Furnace Fan Motor - Measure Data

**Description** – This measure examines the installation of high efficiency brushless permanent magnet fan motor in a qualified natural gas, propane, or fuel-oil fired furnace.

**Measure savings** – An efficient furnace fan motor can create an annual savings of 462 kWh.<sup>122</sup>

**Measure incremental cost** – According to Efficiency Vermont, the incremental cost of a high efficiency furnace fan motor is approximately \$200.<sup>123</sup>

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<sup>120</sup> "High Efficiency Furnaces: A Buying & Care Guide." High Efficiency Furnaces & Forced Air Heating. (www.hometips.com)

<sup>121</sup> "High Efficiency Furnaces: A Buying & Care Guide." High Efficiency Furnaces & Forced Air Heating. (www.hometips.com)

<sup>122</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 550.

**Measure useful life** – The useful life of an efficient furnace fan motor is 18 years.<sup>124</sup>

**Estimated baseline saturation in Vermont** – The saturation of efficient furnace fans in homes that operate central forced air gas-fired furnaces is estimated to be 10%.<sup>125</sup>

Table A-44 - Summary of Data Sources for Efficient Furnace Fan Motors

Cost of high efficiency furnace fan motor	Efficiency Vermont
Cost of standard furnace fan motor	Efficiency Vermont
Energy use of high efficiency furnace fan motor	Efficiency Vermont
Energy use of standard furnace fan motor	Efficiency Vermont
Useful life of high efficiency furnace fan motor	Efficiency Vermont
Baseline saturation of high efficiency furnace fan motor	GDS
Market barrier information	ACEEE
National and regional programs	ACEEE

## 1.15 High Efficiency Energy Star Windows

### 1.15.1 Description of Measure

Typical residential windows in existing residential construction have aluminum or wood frames, high U-values, and are single or double-glazed. U-value is a measure of energy transmittance, the inverse of R-value, so more efficient windows have lower U-values. However, in many areas of the country, heat gains through windows are a major contributor to building cooling load in the summer, and heat loss in the winter contributes to space heating costs. An additional measure of window performance is its Solar Heat Gain Coefficient (SHGC), which considers heat gains that affect cooling energy. SHGC depends primarily on a window's ability to block infrared wavelengths of light through tints and selective coatings. More efficient windows have lower SHGC values.

To be eligible for the ENERGY STAR®, products must be rated, certified, and labeled for both U-Factor and Solar Heat Gain Coefficient (SHGC) in accordance with the procedures of the National Fenestration Rating Council at levels which meet the following ENERGY STAR® qualification criteria in one or more Climate Zone.

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<sup>123</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 552.

<sup>124</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 552.

<sup>125</sup> GDS estimate

### 1.15.2 Market Barriers

High costs are the primary market barrier to customers purchasing or adopting efficient windows in new homes or existing homes. In a recent study, both manufacturers and retailers were uniform in their opinion that price is the overriding barrier to ENERGY STAR® windows adoption, and that new home builders will often take tradeoff approaches to meet code so they can save money on materials. A perceived uncertainty amongst consumers about potential savings generated by ENERGY STAR® windows is another remaining market barrier. Research and development aimed at reducing manufacturing costs, as well as increased education efforts may be helpful. Regional approaches, in particular, appear to be productive.

Two recent activities that address market barriers to increased window efficiency include DOE's ENERGY STAR® labeling program (labels are expected to be found in stores in mid-1998) and the formation of the Efficient Windows Collaborative (EWC). The EWC is a coalition of manufacturers, researchers, and government agencies that aims to expand the market for high efficiency fenestration products. To achieve its goals, the EWC:

- Provides consumer education
- Offers training and education to company sales forces and trade ally audiences
- Develops demonstration projects for regional marketing and education opportunities;
- Works to strengthen national and state building codes to incorporate efficient window standards; and
- Communicates information on market trends, technical information, training opportunities and demonstration results to a broad audience.

In addition, the EWC can offer both technical and logistical support to utility planning efforts, emphasizing information on the energy and peak demand performance of windows, as well as liaison with on-going national activities, such as the NFRC rating and labeling procedures, or the ENERGY STAR® Window and ENERGY STAR Builder programs.

Regional groups and utilities can take advantage of these national efforts. PG&E, for example, plans to work collaboratively with NFRC, and the ENERGY STAR® program to promote high efficiency windows (particularly spectrally selective glazing products) for new and existing homes. The EWC project includes a comprehensive awareness campaign, sales training for manufacturers, and technical assistance for builders. As market share for efficient windows increases, incorporating more aggressive efficiency requirements for windows into building codes will become a viable approach to sustaining the market.

### 1.15.3 High Efficiency Windows - Measure Data

**Description** – In a typical house, over 40% of the annual energy budget is consumed by heating and cooling. Proper selection of windows, doors and skylights can significantly effect how much money is spent or saved every year on keeping homes bright and comfortable. In Vermont, ENERGY STAR® qualified windows have a U-value of less than .35. ENERGY STAR® does not specify a required SHGC value for the northern climate zone.<sup>126</sup>

**Measure savings** – The annual electric energy savings derived from the installation of ten ENERGY STAR® qualified windows in a single family home with electric heating is approximately 5,000 kWh. The savings due to installation of ten ENERGY STAR® qualified windows in a multi family home with electric heating is approximately 2,500 kWh per year.<sup>127</sup>

**Measure incremental cost** – The incremental cost of ENERGY STAR® qualified windows in a household is \$200 (\$20 per window).<sup>128</sup>

**Measure useful life** – The useful life of a high efficiency window is 35 years.<sup>129</sup>

**Estimated baseline saturation in Vermont** – ENERGY STAR® qualified windows are currently installed in approximately 60% of electric heated households in Vermont.<sup>130</sup>

Table A-45 - Summary of Data Sources for High Efficiency Window Technology

Incremental cost information	NEEP
Annual Energy savings information	GDS, John Plunkett
Useful life of high efficiency window	ACEEE
Baseline saturation of HE window	KEMA
Market barrier information	ACEEE, CEE
National and regional programs	NEEP, MEEA, NEEA, EPA

<sup>126</sup> Energy Star website. ([www.energystar.gov/products/windows](http://www.energystar.gov/products/windows))

<sup>127</sup> Annual savings based on figures derived from "Supplemental Findings on GDS Draft Potential Study – Residential Sector" comments by John Plunkett in April 2006.

<sup>128</sup> "Baseline Characterization of the Residential Market for Energy Star Windows in the Northeast." The study was prepared for NEEP by Quantec LLC and Nexus Market Research in October of 2002. Table V.10 on page V-11

<sup>129</sup> "Selecting Targets for Market Transformation Programs, A National Analysis", ACEEE Report. August 1998, page 60.

<sup>130</sup> "Phase 2 Evaluation of the Efficiency Vermont Residential Programs." KEMA, Inc. December 2005. pg 3-33.

## 1.16 Weatherization Technologies

### 1.16.1 Description of Measure – Residential Weatherization Technologies

Weatherization measures address the reduction of thermal transfer through the “shell” between the interior and exterior of a heated/cooled structure. These measures can appear in the form of air-sealing to prevent air infiltration and heat loss through gaps in the building shell, or in the form of insulation to reduce the amount of heat flow between conditioned and unconditioned spaces.

Heat moves from warmer spaces to cooler spaces. In a typical home heat moves directly from heated living spaces to adjacent unheated spaces such as attics, basements and crawl spaces. The degree to which this heat transfer takes place depends upon the R-value of various building shell components such as ceilings, walls and floors. The R-value represents a material's resistance to *thermal* conductance or heat flow and depends upon three factors: the material's type, density, and thickness.

Recommended R-values are suggested from two different points of view: those R-values recommended for maximum comfort and those recommended for maximum energy efficiency. Most R-values established by local building codes are set based on comfort, while those proposed by the U.S. Department of Energy focus on energy efficiency. For this reason, even newer homes can receive added insulation and produce a payback within a few years. Recommended R-values for a particular home are dependent upon the building shell component being considered, the climactic zone and the heat fuel type.

Air infiltration accounts for one of the largest contributions to excess energy usage in existing residential structures. Air infiltration is typically measured by either the number of air changes per hour (ACH) or cubic feet per minute (CFM). These quantities are usually expressed at an assumed pressure (50 pascals).<sup>131</sup>

Factors affecting the air infiltration include the following:

- the temperature differential between the indoor and outdoor air temps,
- wind speed,
- terrain and
- the degree to which air moves through the building shell.

Of these factors, the latter is the one most commonly addressed with DSM measures.

To ascertain the leakiness of a structure, a blower door test can be performed. While the blower door has the home depressurized a technician will seek out points of air infiltration using a smoke puffer. Once areas of air infiltration are

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<sup>131</sup> Suozzo, Margaret and Steven Nadel, “Selecting Targets for Market Transformation programs: A National Analysis”, ACEEE, 1998.

located they are addressed using caulking, sealants and weather stripping. Typical points of air infiltration include areas around windows and doors, and areas where plumbing and electrical infrastructure penetrate the buildings shell between heated and unheated spaces.

#### 1.16.2 Market Barriers – Weatherization

Market barriers for weatherization in residential settings may include the following<sup>132</sup>:

High First Cost – The cost of installing weather stripping is not expensive. However, to insulate large attic spaces and walls can be more costly. Often areas needing additional insulation are not accessible and require additional light construction expense for creating access to certain areas. Also, usually the installation of loose fill insulation requires hiring a professional insulation company with specialized equipment.

Information or research costs - The costs of researching and identifying energy efficient products or services. This includes the value of the time spent locating a product or service or the cost of hiring someone to do this research.

Performance uncertainties – The uncertainty that energy efficiency investment will actually return stated savings.

Transaction Costs – This refers to the indirect cost and hassle of hiring contractors or purchasing energy efficient equipment.

In addition, a large segment of the residential market is within rental housing where if the tenant pays for the heat and electricity there is little incentive for the property owner to invest in their property without foreseeing a direct return on investment. Similarly, in cases where units are master metered and therefore individual household consumption is not monitored, there is little incentive for tenants to alter their behavior to save energy.

#### 1.16.3 Weatherization/Insulation

**Description** – Inadequate insulation and air leakage are leading causes of energy waste in most homes. Properly installed weatherization measures can reduce a home's energy expenses by over 30 percent.<sup>133</sup> The following measures were used in the Vermont weatherization and insulation program modeled in this study: attic insulation, wall insulation, floor insulation, and air sealing. The base home R-value assumptions are based on survey results conducted by GDS in February 2006 with three contractors in Vermont that have

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<sup>132</sup> New York Energy \$mart<sup>SM</sup> Program Evaluation and Status Report, Interim Report, 9/2000.

<sup>133</sup> "Energy Savers: Insulation and Sealing Air Leaks" DOE Energy Efficiency and Renewable Energy. March 2006. ([www.eere.energy.gov](http://www.eere.energy.gov))

experience providing insulation and weatherization upgrades to existing homes. The objective of this survey was to determine the "base" home to be used for conducting an analysis of potential energy savings by upgrading to an "improved" home.

Low-Income Homes were also included in this analysis. Low-Income homes receive 100% incentive for the cost of the measures, and qualify based on income. Eligible households have an annual income of 60% (or more) below the state median income for households.

Table A-46 – R-value upgrades for Weatherization/Insulation Program Measures

Base Home	Upgraded Home
Attic insulation R-19	Attic insulation to R-38
Wall insulation R-0	Wall insulation to R-13
Floor insulation R-0	Floor insulation to R-19
Air infiltration to .75 ACH	Reduced air infiltration to .50 ACH

**Measure savings** – Energy savings for the addition of insulation will depend upon change in R-Value between the insulation that already exists and what is being added. Savings are calculated based upon this change in R-value, the heating-degree-days (HDD) at the project's location and the square footage of the area to be insulated. In a typical house in Vermont, the weatherization/insulation program would save an average of 6000 kWh annually in single-family houses, and 3000 kWh annually in multi-family houses.<sup>134</sup> Low income housing would also benefit from insulation/weatherization measures. A low income single family house would save an average of 6000 kWh per year, while a multi family home would realize an estimated annual savings of 3000 kWh.<sup>135</sup>

**Measure incremental cost** – The incremental cost of all measures combined is approximately \$2,000.<sup>136</sup>

**Measure useful life** – The useful life of building shell measures are typically 20 years.<sup>137</sup>

**Estimated baseline saturation in Vermont** – Approximately 75% of non low-income homes in Vermont with electric heating have been properly insulated and

<sup>134</sup> Annual savings based on figures derived from "Supplemental Findings on GDS Draft Potential Study – Residential Sector" comments by John Plunkett in April 2006.

<sup>135</sup> *ibid.*

<sup>136</sup> GDS calculation based on program incentive figures from KeySpan Weatherization program completed in February 2006

<sup>137</sup> GDS calculation based on useful life of insulation/weatherization individual measures.



weatherized.<sup>138</sup> Nearly 40% of low-income homes have also been properly weatherized and insulated with the help of a weatherization assistance program.<sup>139</sup>

Table A-47 - Summary of Data Sources for Weatherization/Insulation Technology

Incremental cost information	GDS
Annual Energy savings information	GDS, John Plunkett
Useful life of high efficiency window	GDS
Baseline saturation of HE window	GDS
Market barrier information	ACEEE, CEE
National and regional programs	DOE, EPA

## 1.17 Residential New Construction

### 1.17.1 Description of Measure – Residential New Construction

ENERGY STAR® qualified new homes are new residential construction projects that have been independently verified to be at least 30% more energy efficient than homes built to the 1993 national Model Energy Code or 15% more efficient than state energy code, whichever is more rigorous. Only recently, have newer standards and a new Home Energy Rating System (HERS) come into effect. These new guidelines and new HERS rating system must be used to qualify homes for the ENERGY STAR® label that are not enrolled in a state or utility program before December 31, 2005 or permitted before July 1, 2006.

The new system evaluates the energy efficiency of a home compared to a computer-simulated reference house of identical size and shape as the rated home that meets minimum requirements of the 2004 International Energy Conservation Code (IECC). The HERS rating results in a HERS Index score between 0 and 100, with the reference house assigned a score of 100 and a zero energy house assigned a score of 0. Each 1 percent reduction in energy usage (compared to the reference house) results in a one point decrease in the HERS score. Thus, an ENERGY STAR® Qualified Home, required to be approximately 15 percent more energy efficient than 2004 IECC in the south requires a HERS Index of 85; and an ENERGY STAR® Qualified Home, required to be approximately 20 percent more energy efficient than 2004 IECC in the north requires a HERS Index of 80.<sup>140</sup>

<sup>138</sup> GDS Assumption based on meeting with Efficiency Vermont and Vermont Department of Public Services

<sup>139</sup> GDS Calculation based on figures provided by the Vermont OEO Weatherization Program and poverty statistics from the US Census.

<sup>140</sup> "September 2005 Update: EPA Releases Final New Guidelines for ENERGY STAR Qualified Homes." ([www.energystar.gov](http://www.energystar.gov))

Savings are based on heating, cooling, and hot water energy use and typically achieved through a combination of: high performance windows, controlled air infiltration, upgraded heating and conditioning systems, tight duct systems, high efficiency water-heating equipment, and high efficiency building envelope standards. These features contribute to improved home quality and homeowner comfort, and to lower energy demand and reduced air pollution. ENERGY STAR® also encourages the use of energy-efficient lighting and appliances, as well as features designed to improve indoor air quality.

Any single-family or multi-family residential home that is three stories or less in height can qualify to receive the ENERGY STAR® label. This includes traditional site-constructed homes as well as modular, systems-built (e.g., insulated concrete forms, structurally insulated panels), and HUD-code manufactured homes.

#### 1.17.2 Market Barriers

An initial evaluation of the New Construction Program by KEMA, Inc found that most builders and customers were confused regarding program benefits and procedures. This confusion may have been due to frequent changes in the program name and features between 1999 and 2003. Targeted mail and phone call campaigns to builders statewide, as well as outreach to municipal officials and builders of manufactured homes are some of the efforts that are underway to educate and increase interest in the ENERGY STAR® new homes program. Increasing builder awareness of non-energy benefits of energy efficient equipment (including increased comfort and lower equipment maintenance costs) is also important to the success of program.

#### 1.17.3 Vermont ENERGY STAR® Homes- Measure Data

**Description** – To qualify for the Vermont ENERGY STAR® Homes designation, a house has to achieve a Home Energy Rating of 86, which is equivalent to the EPA's 5-star ENERGY STAR® home rating. Homes must contain high levels of insulation, efficient heating and hot water equipment, and high quality air sealing measures to meet this rating. Homes that meet these standards will use approximately 20% less energy for heating, cooling, and hot water than those that meet the minimum requirements of Vermont's Residential Energy Building Standard. In addition, qualifying homes need to contain at least 10 energy efficient lighting fixtures of 30% of fixtures (whichever is lower), and efficient mechanical ventilation systems.

**Measure savings** – An ENERGY STAR® qualified home saves an average of 1671 kWh per year based on previously collected program data.<sup>141</sup> In addition,

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<sup>141</sup> Efficiency Vermont 2004 Annual Report. Nov. 2005. pg 49

these new construction projects will also save approximately 32 mmbtu and 1331 gallons annually and gas and water savings, respectively.<sup>142</sup>

**Measure incremental cost** – The incremental cost of building a new home to meet the ENERGY STAR® Homes criteria is approximately \$998.<sup>143</sup>

**Measure useful life** – The useful life of an ENERGY STAR® qualified home is 18 years.<sup>144</sup>

**Estimated baseline saturation in Vermont** – 20% of newly constructed homes in Vermont already participate in the ENERGY STAR® Homes program.<sup>145</sup>

Table A-48 - Summary of Data Sources for ENERGY STAR® Homes program

Cost of ENERGY STAR® qualified home	Efficiency Vermont
Cost of standard new home	Efficiency Vermont
Energy use of ENERGY STAR® qualified home	Efficiency Vermont
Energy use of standard new home	Efficiency Vermont
Useful life of ENERGY STAR® qualified home	Efficiency Vermont
Baseline saturation of ENERGY STAR® qualified home	KEMA
Market barrier information	KEMA
National and regional programs	EPA

## 1.18 Fuel-Switching Options

### 1.18.1 Description of Measure – Fuel Switching Options

Replacing, upon burnout, an electric consuming appliance with an efficient non-electric appliance is another option to reduce electric consumption. In addition to eliminating the electric use, non-electric fuels are generally a more cost effective energy source as the fuel source is burned directly at the house for heating rather than being first converted to electricity at the power plant.<sup>146</sup>

### 1.18.2 Market Barriers

The incremental cost of replacing an electric-based system with a non-electric based system is one potential barrier to fuel-switching. Non electric high efficiency appliances are generally more costly than their electric counterparts.

<sup>142</sup> Efficiency Vermont 2004 Annual Report. Nov. 2005. pg 50 & Efficiency Vermont 2003 Annual Report. Nov. 2004. pg 48

<sup>143</sup> Efficiency Vermont 2004 Annual Report. Nov. 2005. pg 49

<sup>144</sup> *ibid.*

<sup>145</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

<sup>146</sup> "Home Energy Briefs: #5 Water Heating." Rocky Mountain Institute. 2004 ([www.rmi.org](http://www.rmi.org))

In addition, the cost effectiveness of fuel-switching is also challenged by changes in residential gas prices. The decrease in electric consumption may be offset by the rise in gas consumption and the accompanying cost. While some early programs have claimed success with fuel-switching, other programs have recently claimed no long term economic advantage.<sup>147,148</sup> The type of fuel a residence has access to switch to will limit consumer options for fuel-switching.

### 1.18.3 Fuel Switching (Electric Water Heater to Natural Gas) - Measure Data

**Description** – This measure examines the installation of an efficient natural gas water heater upon burnout of an electric water heater. All estimates are based on the installation of a standard tank size natural gas water heater with an efficiency rating of .59 in lieu of a high efficiency electric water heater with an efficiency rating of .88.

**Measure savings** – The saving derived from fuel-switching is the entire electric energy consumption of the electric unit.<sup>149</sup> Conversely, there is an increase in gas consumption from the installation of a high efficiency natural gas water heater.<sup>150</sup> The following table displays the kWh savings and increased gas consumption for each household size.

Table A-49 - Summary of Measure Savings for Fuel Switching (Electric Water Heater to Natural Gas)

Num. of Bedrooms	Annual kWh Savings	Increased mmbtu consumption
1	2400	12.22
2	3000	15.27
3	3600	18.33
4	4500	22.91
5 or more	5400	27.49

**Measure incremental cost** – The incremental cost to consumers from switching a high efficiency electric water heater to an efficient natural gas water heater is roughly \$500.<sup>151</sup>

**Measure useful life** – The useful life of a natural gas water heater is 13 years.<sup>152</sup>

<sup>147</sup> "Making Low Income Housing Affordable: The Northgate Retrofits." Home Energy Magazine Online March/April 1993. Accessed April 2006. ([www.homeenergy.org](http://www.homeenergy.org))

<sup>148</sup> "Smart Choices for Consumers: Analysis of the Best Ways to Reduce Heating Costs." Consumer Energy Council of America. CECA Heating Fuels Report, Nov. 2005. ([www.cecacr.org](http://www.cecacr.org))

<sup>149</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 574.

<sup>150</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 579.

<sup>151</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577.

<sup>152</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 576.

**Estimated baseline saturation in Vermont** – Approximately 37% of all water heaters in single family homes in Vermont are heated with electricity (41.6% of all multi-family homes). These electric water heaters are candidates for fuel-switching to a non-electric fuel source. 5% of homes with electric water heaters utilize natural gas as their primary heating source.<sup>153</sup> Table A-50 displays the percent of Vermont homes, broken down by number of bedrooms that have electric water heaters and the ability to fuel-switch to a natural gas water heater.

Table A-50 – Percent of Homes in Vermont with Fuel Switching Ability (Electric Water Heater to Natural Gas)

Num. of Bedrooms	Single Family Natural Gas	Multi Family Natural Gas
1	0.10%	0.50%
2	0.40%	0.80%
3	0.90%	0.60%
4	0.40%	0.10%
5 or more	0.10%	< .01%

Table A-51 - Summary of Data Sources for WH Fuel Switching Opportunity

Cost of high efficiency natural gas WH	Efficiency Vermont
Cost of high efficiency electric WH	Efficiency Vermont
Energy use of HE natural gas WH	Efficiency Vermont
Energy use of HE electric WH	Efficiency Vermont
Useful life of HE natural gas WH	Efficiency Vermont
Baseline saturation of fuel switching candidates to a natural gas WH	KEMA
Market barrier information	CECA, ACEEE, Home Energy
National and regional programs	ACEEE, RMI

#### 1.18.4 Fuel Switching (Electric Water Heater to Fuel Oil) - Measure Data

**Description** – This measure examines the installation of an efficient fuel oil water heater upon burnout of a standard electric water heater. All estimates are based on the installation of a standard tank size fuel oil water heater with an efficiency rating of .64 in lieu of a high efficiency electric water heater with an efficiency rating of .88.

**Measure savings** – The saving derived from fuel-switching is the entire electric energy consumption of the electric unit.<sup>154</sup> Conversely, there is an increase in

<sup>153</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

<sup>154</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 574.

gas consumption from the installation of a high efficiency fuel oil water heater.<sup>155</sup> The following table displays the kWh savings and increased gas consumption for each household size.

Table A-52 - Summary of Measure Savings for Fuel Switching (Electric Water Heater to Fuel Oil)

Num. of Bedrooms	Annual kWh Savings	Increased mmbtu consumption
1	2400	11.26
2	3000	14.08
3	3600	16.89
4	4500	21.12
5 or more	5400	25.34

**Measure incremental cost** – The incremental cost to consumers from switching a high efficiency electric water heater to an efficient fuel oil water heater is roughly \$1,575.<sup>156</sup>

**Measure useful life** – The useful life of a fuel oil water heater is 10 years.<sup>157</sup>

**Estimated baseline saturation in Vermont** – Approximately 37% of all water heaters in single family homes in Vermont are heated with electricity (41.6% of all multi-family homes). These electric water heaters are candidates for fuel-switching to a non-electric fuel source. 51% of homes with electric water heaters utilize fuel oil as their primary heating source.<sup>158</sup> Table A-53 displays the percent of Vermont homes, broken down by number of bedrooms that have electric water heaters and the ability to fuel-switch to a fuel oil water heater.

Table A-53 – Percent of Homes in Vermont with Fuel Switching Ability (Electric Water Heater to Fuel Oil)

Num. of Bedrooms	Single Family Fuel Oil	Multi Family Fuel Oil
1	0.70%	4.80%
2	3.70%	8.40%
3	9.00%	6.30%
4	4.20%	1.40%
5 or more	1.20%	.20%

<sup>155</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 579.

<sup>156</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577.

<sup>157</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 576.

<sup>158</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

Table A-54 - Summary of Data Sources for WH Fuel Switching Opportunity

Cost of high efficiency fuel oil WH	Efficiency Vermont
Cost of high efficiency electric WH	Efficiency Vermont
Energy use of HE fuel oil WH	Efficiency Vermont
Energy use of HE electric WH	Efficiency Vermont
Useful life of HE fuel oil WH	Efficiency Vermont
Baseline saturation of fuel switching candidates to a fuel oil WH	KEMA
Market barrier information	CECA, ACEEE, Home Energy
National and regional programs	ACEEE, RMI

#### 1.18.5 Fuel Switching (Electric Water Heater to Propane) - Measure Data

**Description** – This measure examines the installation of an efficient propane water heater upon burnout of a standard electric water heater. All estimates are based on the installation of a standard tank size propane water heater with an efficiency rating of .61 in lieu of a high efficiency electric water heater with an efficiency rating of .88.

**Measure savings** – The saving derived from fuel-switching is the entire electric energy consumption of the electric unit.<sup>159</sup> Conversely, there is an increase in gas consumption from the installation of a high efficiency propane water heater.<sup>160</sup> The following table displays the kWh savings and increased gas consumption for each household size.

Table A-55 - Summary of Measure Savings for Fuel Switching (Electric Water Heater to Propane)

Num. of Bedrooms	Annual kWh Savings	Increased mmbtu consumption
1	2400	11.82
2	3000	14.77
3	3600	17.73
4	4500	22.16
5 or more	5400	26.59

**Measure incremental cost** – The incremental cost to consumers from switching a high efficiency electric water heater to an efficient propane water heater is roughly \$800.<sup>161</sup>

**Measure useful life** – The useful life of a propane water heater is 13 years.<sup>162</sup>

<sup>159</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 574.

<sup>160</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 579.

<sup>161</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577.

**Estimated baseline saturation in Vermont** – Approximately 37% of all water heaters in single family homes in Vermont are heated with electricity (41.6% of all multi-family homes). These electric water heaters are candidates for fuel-switching to a non-electric fuel source. 14% of homes with electric water heaters utilize propane as their primary heating source.<sup>163</sup> Table A-56 displays the percent of Vermont homes, broken down by number of bedrooms that have electric water heaters and the ability to fuel-switch to a propane water heater.

Table A-56 – Percent of Homes in Vermont with Fuel Switching Ability (Electric Water Heater to Propane)

Num. of Bedrooms	Single Family Fuel Oil	Multi Family Fuel Oil
1	0.20%	1.30%
2	1.00%	2.30%
3	2.50%	1.70%
4	1.10%	0.40%
5 or more	0.30%	0.10%

Table A-57 - Summary of Data Sources for WH Fuel Switching Opportunity

Cost of high efficiency propane WH	Efficiency Vermont
Cost of high efficiency electric WH	Efficiency Vermont
Energy use of HE propane WH	Efficiency Vermont
Energy use of HE electric WH	Efficiency Vermont
Useful life of HE propane WH	Efficiency Vermont
Baseline saturation of fuel switching candidates to a propane WH	KEMA
Market barrier information	CECA, ACEEE, Home Energy
National and regional programs	ACEEE, RMI

#### 1.18.6 Fuel Switching (Electric Water Heater to Kerosene - Instantaneous) - Measure Data

**Description** – This measure examines the installation of an efficient instantaneous kerosene water heater upon burnout of a standard electric water heater. All estimates are based on the installation of a standard size instantaneous kerosene water heater with an efficiency rating of .88 in lieu of a high efficiency electric water heater with an efficiency rating of .88.

**Measure savings** – The saving derived from fuel-switching is the entire electric energy consumption of the electric unit.<sup>164</sup> Conversely, there is an increase in

<sup>162</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 576.

<sup>163</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

<sup>164</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 574.



gas consumption from the installation of a high efficiency kerosene water heater.<sup>165</sup> The following table displays the kWh savings and increased gas consumption for each household size.

Table A-58 - Summary of Measure Savings for Fuel Switching (Electric Water Heater to Kerosene)

Num. of Bedrooms	Annual kWh Savings	Increased mmbtu consumption
1	2400	8.19
2	3000	10.24
3	3600	12.29
4	4500	15.36
5 or more	5400	18.43

**Measure incremental cost** – The incremental cost to consumers from switching a high efficiency electric water heater to an efficient kerosene water heater is roughly \$2,000.<sup>166</sup>

**Measure useful life** – The useful life of a kerosene water heater is 15 years.<sup>167</sup>

**Estimated baseline saturation in Vermont** – Approximately 37% of all water heaters in single family homes in Vermont are heated with electricity (41.6% of all multi-family homes). These electric water heaters are candidates for fuel-switching to a non-electric fuel source. 16% of homes with electric water heaters utilize kerosene as their primary heating source.<sup>168</sup> Table A-59 displays the percent of Vermont homes, broken down by number of bedrooms that have electric water heaters and the ability to fuel-switch to a kerosene water heater.

Table A-59 – Percent of Homes in Vermont with Fuel Switching Ability (Electric Water Heater to Kerosene)

Num. of Bedrooms	Single Family Fuel Oil	Multi Family Fuel Oil
1	0.20%	1.50%
2	1.20%	2.60%
3	2.80%	2.00%
4	1.30%	0.50%
5 or more	0.40%	0.10%

<sup>165</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 579.

<sup>166</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 577.

<sup>167</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 576.

<sup>168</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

Table A-60 - Summary of Data Sources for WH Fuel Switching Opportunity

Cost of high efficiency kerosene WH	Efficiency Vermont
Cost of high efficiency electric WH	Efficiency Vermont
Energy use of HE kerosene WH	Efficiency Vermont
Energy use of HE electric WH	Efficiency Vermont
Useful life of HE kerosene WH	Efficiency Vermont
Baseline saturation of fuel switching candidates to a propane WH	KEMA
Market barrier information	CECA, ACEEE, Home Energy
National and regional programs	ACEEE, RMI

#### 1.18.7 Fuel Switching (Electric Water Heater to Kerosene – Stand Alone) - Measure Data

**Description** – This measure examines the installation of an efficient stand alone kerosene water heater upon burnout of a standard electric water heater. All estimates are based on the installation of a standard tank size kerosene water heater with an efficiency rating of .68 in lieu of a high efficiency electric water heater with an efficiency rating of .95.

**Measure savings** – The saving derived from fuel-switching is the entire electric energy consumption of the electric unit. A high efficiency electric water heater consumes an average of 3,068.25 kWh per year in a single family home, 2524.22 kWh per year for multi-family homes.<sup>169</sup> Conversely, there is an increase in gas consumption (an annual average of 152.6 therms for single family homes and 128.7 therms) from the installation of a high efficiency kerosene water heater.<sup>170</sup>

**Measure incremental cost** – The incremental cost to consumers from switching a high efficiency electric water heater to an efficient kerosene water heater is roughly \$1880.<sup>171</sup>

**Measure useful life** – The useful life of a kerosene water heater is 10 years.<sup>172</sup>

**Estimated baseline saturation in Vermont** – Approximately 37% of all water heaters in single family homes in Vermont are heated with electricity (41.6% in multi family homes). These electric water heaters are candidates for fuel-

<sup>169</sup> Energy end use computer model developed by Energy Center of Wisconsin; model run by GDS on April 6, 2006.

<sup>170</sup> Energy end use computer model developed by Energy Center of Wisconsin; model run by GDS on April 6, 2006.

<sup>171</sup> GDS Calculation based on list price of kerosene water heater models made by John Wood and Bradford-White. April 18, 2006.

<sup>172</sup> GDS estimate based on similar model assumptions.

switching to a non-electric fuel source. 16% of homes with electric water heaters utilize kerosene as their primary heating source.<sup>173</sup>

Table A-61 - Summary of Data Sources for WH Fuel Switching Opportunity

Cost of high efficiency kerosene WH	GDS
Cost of high efficiency electric WH	GDS
Energy use of HE kerosene WH	GDS
Energy use of HE electric WH	GDS
Useful life of HE kerosene WH	GDS
Baseline saturation of fuel switching candidates to a kerosene WH	KEMA
Market barrier information	CECA, ACEEE, Home Energy
National and regional programs	ACEEE, RMI

#### 1.18.8 Fuel Switching (Electric Water Heater to Wood) - Measure Data

**Description** – This measure examines the installation of an efficient wood water heater upon burnout of a standard electric water heater. All estimates are based on the installation of a standard tank size wood consuming water heater with an efficiency rating of .50 in lieu of a high efficiency electric water heater with an efficiency rating of .95.

**Measure savings** – The saving derived from fuel-switching is the entire electric energy consumption of the electric unit. A high efficiency electric water heater consumes an average of 3,068.25 kWh per year in a single family home, 2524.22 kWh per year for multi-family homes.<sup>174</sup> Conversely, there is an increase in wood consumption (an annual average of 207.5 therms for single family homes and 174.8 therms) from the installation of a high efficiency wood water heater.<sup>175</sup>

**Measure incremental cost** – The incremental cost to consumers from switching a high efficiency electric water heater to an efficient wood water heater is roughly \$1320.<sup>176</sup>

**Measure useful life** – The useful life of a wood water heater is 10 years.<sup>177</sup>

**Estimated baseline saturation in Vermont** – Approximately 37% of all water heaters in single family homes in Vermont are heated with electricity (41.6% in multi family homes). These electric water heaters are candidates for fuel-

<sup>173</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

<sup>174</sup> Energy end use computer model developed by Energy Center of Wisconsin; model run by GDS on April 6, 2006.

<sup>175</sup> Energy end use computer model developed by Energy Center of Wisconsin; model run by GDS on April 6, 2006.

<sup>176</sup> GDS phone call with Black Stove Shop (Maine) on March 28, 2006.

<sup>177</sup> GDS estimate based on similar model assumptions.

switching to a non-electric fuel source. 14% of homes with electric water heaters utilize wood as their primary heating source.<sup>178</sup>

Table A-62 - Summary of Data Sources for WH Fuel Switching Opportunity

Cost of high efficiency wood WH	GDS
Cost of high efficiency electric WH	GDS
Energy use of HE wood WH	GDS
Energy use of HE electric WH	GDS
Useful life of HE wood WH	GDS
Baseline saturation of fuel switching candidates to a wood WH	KEMA
Market barrier information	CECA, ACEEE, Home Energy
National and regional programs	ACEEE, RMI

#### 1.18.9 Fuel Switching (Electric Space Heating to Non-Electric Space Heating) - Measure Data

**Description** – This measure examines the installation of an efficient non-electric space heater upon burnout of a standard electric space heater.

**Measure savings** – The saving derived from fuel-switching is the entire electric energy consumption of the electric unit. An electric space heater consumes an average of 20,000 kWh per year in a single family home, 10,000 kWh per year for multi-family homes.<sup>179</sup> Conversely, there is an increase in fuel consumption (an annual average of 853.3 therms for single family homes and 426.6 therms) from the installation of a high efficiency non-electric space heater.<sup>180</sup>

**Measure incremental cost** – The incremental cost to consumers from switching an electric space heater to an efficient non-electric space heater is roughly \$6,500.<sup>181</sup>

**Measure useful life** – The useful life of a high efficiency non-electric space heater is 20 years.<sup>182</sup>

**Estimated baseline saturation in Vermont** – Approximately 2% of all homes in Vermont are heated with electricity.<sup>183</sup>

<sup>178</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

<sup>179</sup> GDS calculation based on figures derived from “Supplemental Findings on GDS Draft Potential Study-Residential Sector” comments by John Plunkett

<sup>180</sup> GDS calculation based on figures derived from “Supplemental Findings on GDS Draft Potential Study-Residential Sector” comments by John Plunkett.

<sup>181</sup> Optimal Energy Model Input Assumptions, 2003.

<sup>182</sup> GDS estimate based on known space heating measures.

<sup>183</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

Table A-63 - Summary of Data Sources for Space Heating Fuel Switching Opportunity

Cost of high efficiency non-electric space heating unit	Optimal Energy
Cost of electric space heating unit	Optimal Energy
Energy use of high efficiency non-electric space heating unit	GDS
Energy use of electric space heating unit	GDS
Useful life of high efficiency non-electric space heating unit	GDS
Baseline saturation of homes with electric space heating	KEMA
Market barrier information	CECA, ACEEE, Home Energy
National and regional programs	ACEEE, RMI

#### 1.18.10 Fuel Switching (Electric Clothes Dryer to Natural Gas/Propane) - Measure Data

**Description** – This measure examines the installation of an efficient clothes dryer heated with natural gas or propane upon burnout of a standard electric clothes dryer.

**Measure savings** – The saving derived from fuel-switching is the entire electric energy consumption of the electric unit. An electric clothes dryer consumes an average of 942 kWh per year.<sup>184</sup> Conversely, there is an increase in gas consumption (an annual average of 33.8 therms) from the installation of a high efficiency non-electric clothes dryer.<sup>185</sup>

**Measure incremental cost** – The incremental cost to consumers from switching an electric clothes dryer to an efficient non-electric clothes dryer is roughly \$375.<sup>186</sup>

**Measure useful life** – The useful life of a clothes dryer is 14 years.<sup>187</sup>

**Estimated baseline saturation in Vermont** – Approximately 15% of all single family homes in Vermont are equipped with electric clothes dryers and have access to natural gas or propane for fuel-switching (19% in multi family

<sup>184</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 36.

<sup>185</sup> *ibid.*

<sup>186</sup> *ibid.*

<sup>187</sup> Efficiency Vermont Residential Master Technical Reference User Manual No. 2005-37. Page 37.

homes).<sup>188</sup> These electric clothes dryers are candidates for fuel-switching to a non-electric fuel source.

Table A-64 - Summary of Data Sources for Electric Clothes Dryer Fuel Switching Opportunity

Cost of high efficiency non-electric clothes dryer	Efficiency Vermont
Cost of electric clothes dryer	Efficiency Vermont
Energy use of HE non-electric clothes dryer	Efficiency Vermont
Energy use of electric clothes dryer	Efficiency Vermont
Useful life of HE non-electric clothes dryer	Efficiency Vermont
Baseline saturation of fuel switching candidates to a non-electric clothes dryer	KEMA
Market barrier information	CECA, ACEEE, Home Energy
National and regional programs	ACEEE, RMI

## 1.19 Emerging Technologies

### 1.19.1 Emerging Technologies – LED Lighting

Highly efficient light-emitting diodes (LED's) are a relatively old technology (1970's) and currently dominate the exit sign market as well as being adopted in many cities for replacement of incandescent lamps in traffic signals. In the residential market the white light LED has opened the eyes of many lighting experts; however, they currently do not produce enough lumen output to enable them to be on a competitive level with many general light sources.

By 2020, solid-state lighting devices such as LED's could cut electricity used for illumination by 50 percent, according to a US Department of Energy study and with continued studies and analyses on this technology, commercial availability should increase to a substantial level within the near future.<sup>189</sup>

### 1.19.2 Emerging Technologies – Residential Cogeneration Systems

Cogeneration systems in the residential sector have the ability to produce both useful thermal energy and electricity from a single source of fuel such as oil or natural gas. This means that the efficiency of energy conversion to useful heat and power is potentially significant greater than by using the traditional alternatives of boilers or furnaces and conventional fossil fuel fired central electricity generation systems.<sup>190</sup> In one testing case, a collaborative effort between American Honda Motor Company and Massachusetts-based Climate

<sup>188</sup> GDS Calculation based on Vermont Residential Appliance Saturation Study completed by Kema, Inc. 2005.

<sup>189</sup> "LED There Be Light" David Pescovitz. Berkeley Engineering Lab Notes. Vol. 2(8): 2002.

<sup>190</sup> Residential Cogeneration Systems: A Review of Current Technologies. International Energy Agency. April 2005.

Energy, LLC has resulting in the residential installation of a micro-sized combined heat and power system combined with a furnace or boiler. This complete system results in more than 85% efficiency in converting fuel energy into useful heat and electric power. The unit quietly generates up to three kilowatts of thermal output per hour and one kilowatt of electricity.<sup>191</sup> However, as residential scale cogeneration technologies are still in their infancy, the actual potential for residential cogeneration energy and emissions savings is yet to be firmly established.

### 1.19.3 Emerging Technologies – Drainwater Heat Recovery Systems

The Gravity Film Heat Exchanger (GFX) is an energy efficiency system designed to capture the heat in the warm drainwater that falls down a vertical section of copper drainpipe. Heat transfer, which occurs because the water tends to cling to the inside of the vertical pipe like a film, can be transferred to cold water circulating around the outside of the drainpipe. If the drainwater is produced at the same time as the incoming water (such as the constant flow that occurs from a shower), the GFX can capture more than half the drainwater energy.<sup>192</sup> This saves energy otherwise used to generate hot water and effectively extends the recovery performance of the water heater itself, saving money and increasing shower capacity in the process.

Drainwater Heat Recovery Systems will be most effective in multi-family applications to quantify the energy savings and enhanced performance. Although the technology is suited for single family homes too, the greater throughput of drainwater from multifamily dwellings is expected to save more energy and improve the economics of introducing this technology into this sector.<sup>193</sup>

Preliminary findings from a field test utilizing the efficiency measure in one triplex housing unit determined the drain recovery system would save between 25%-30% of the total energy needed for hot water production based on the measured efficiency of the resistance water heater in the triplex. Over the year of this experiment, the system saved the equivalent of 2800 kWh of electricity.<sup>194</sup>

### 1.19.4 Emerging Technologies – Cool Roofs

Cool Roofs are roofs consisting of materials that effectively reflect the sun's energy from the roof surface. Cool materials for low-slope roofs are mainly bright

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<sup>191</sup> "Honda and Climate Energy Provide Innovative and Energy Efficient Heating Solution. " Published March 2006. Accessed April 2006. ([www.hondanews.com](http://www.hondanews.com))

<sup>192</sup> "Emerging Technologies. Building Technologies Program." DOE Energy Efficiency and Renewable Energy. April 2006. ([www.eere.energy.gov](http://www.eere.energy.gov))

<sup>193</sup> *ibid.*

<sup>194</sup> "Preliminary Findings of the GFX Drainwater Recovery System. (Memo)" Prepared by ORNL. Submitted to DOE. Aug. 2000. ([www.eere.doe.org](http://www.eere.doe.org))

white in color, although non-white colors are becoming available for sloped roof applications. Cool Roofs must also have high emissivity, allowing them to emit infrared energy. Unfortunately bare metals and metallic coatings tend to have low emissivity and are not considered cool materials.

Cool roofs reduce the roof surface temperature by up to 100 degrees Fahrenheit, thereby reducing the heat transferred into the building below.<sup>195</sup> This helps to reduce energy costs (by keeping attics and ducts cooler), improve occupant comfort, cut maintenance costs, increase the life cycle of the roof, and reduce urban heat islands along with associated smog.

Products for sloped roofs, usually found on residences, are currently available in clay, or concrete tiles. These products stay cooler by the use of special pigments that reflect the sun's infrared heat. Lower priced shingles or coated metal roofing products are not yet available in "cool" versions.

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<sup>195</sup> "Cool Roofs." Consumer Energy Center. Accessed April 2006. ([www.consumerenergycenter.org](http://www.consumerenergycenter.org))



## **APPENDIX B**

### **Commercial Sector**

Vermont Energy Efficiency Potential Study

Commercial Sector Measure Database

May 10, 2006 - Draft

#	Cost Type: 1=Full 2=Inc.	End Use	Measure Name	Annual kWh Savings	kWh Savings Source	kW demand savings	kW demand source	Annual MMBtu savings	MMBtu savings source	Incremental Cost	Cost Source	Cost/Unit Descriptor	Cost/Unit	Persistence Factor	Measure Life	Effective Measure Life	Measure Life Source	Annualized cost	Levelized cost per kWh saved	Societal Test	TRC Test
100			Space Heating																		
101	2	Space Heating	High Efficiency Heat Pump	195	21	0.1	21			\$48	21	\$/Unit	\$48	1	15	15	21	\$3.17	\$0.0163	5.26	4.31
102	2	Space Heating	Hydronic Heating Pump	10,875	5	1.7	19			\$3,465	5	\$/Unit	\$3,465	1	20	20	15	\$173.25	\$0.0159	3.79	3.01
103	2	Space Heating	Ground Source Heat Pump - Heating	18,121	9	11.7	26			\$33,000	9	\$/Unit	\$33,000	1	15	15		\$2,200.00	\$0.1214	0.57	0.45
150			Water Heating End Use														2				
151	2	Water Heating	Heat Pump Water Heater	14,155	21	6.1	26			\$4,067.01	21	\$/Unit	\$4,067.01	1	14	14	21	\$290.50	\$0.0205	5.97	5.03
152	2	Water Heating	Booster Water Heater	625	21	0.3	26			\$951.37	21	\$/Unit	\$951.37	1	10	10	21	\$95.14	\$0.1522	0.89	0.74
153	1	Water Heating	Point of Use Water Heater	345	21	0.1	26			\$106.88	21	\$/Unit	\$106.88	1	10	10	21	\$10.69	\$0.0310	4.35	3.66
154	1	Water Heating	Solar Water Heating System	62,500	14	26.9	26			\$11,500.00	14	\$/unit	\$11,500.00	1	15	15	14	\$766.67	\$0.0123	9.78	8.23
155	1	Water Heating	Solar Pool Heating	108,644	14	46.8	26			\$33,750.00	14	\$/unit	\$33,750.00	1	10	10	14	\$3,375.00	\$0.0311	4.34	3.65
200			Envelope																		
201	2	Space Heating	Integrated Building Design	530,000	21	364.1	26			\$166,226.40	21	\$/unit	\$166,226.40	1	30	30	21	\$5,540.88	\$0.0105	5.53	4.74
202	2	Space Heating	Double Pane Low Emissivity Windows	7	21	0.0	26	0.0	1	\$0.51	21	\$/sf-window	\$0.51	1	30	30	21	\$0.02	\$0.0024	24.21	20.70
300			Space Cooling - Chillers																		
301	2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 300 tons	21,600	5	23.5	5	0.0		\$16,200	5	\$/unit	\$16,200.00	1	25	25	18	\$648.00	\$0.0300	4.39	3.77
302	2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 500 tons	36,000	5	39.1	5	0.0		\$27,000	5	\$/unit	\$27,000.00	1	25	25	18	\$1,080.00	\$0.0300	4.39	3.77
303	2	Space Cooling - Chillers	Centrifugal Chiller, Optimal Design, 0.4 kW/ton, 500 to	80,000	5	86.9	5	0.0		\$60,000	5	\$/unit	\$60,000.00	1	25	25	18	\$2,400.00	\$0.0300	4.39	3.77
320			Space Cooling - Packaged AC																		
321	2	Space Cooling - Packaged	Electric HVAC	3,160	18	1.0	18			\$500	18	\$/unit	\$500	1	15	15	18	\$33.33	\$0.0105	15.29	13.10
322	2	Space Cooling - Packaged	DX Packaged system EER = 10.9, 10 tons	1,859	5	1.9	5	0.0		\$607		\$/unit	\$607	1	15	15	18	\$40.47	\$0.0218	7.41	6.35
323	2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, <20 Tons	2,789	5	3.0	5	0.0		\$612		\$/unit	\$612	1	15	15	18	\$40.80	\$0.0146	11.02	9.45
324	2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, >20 Tons	5,578	5	6.1	5	0.0		\$1,813		\$/unit	\$1,813	1	15	15	18	\$120.87	\$0.0217	7.44	6.38
325	2	Space Cooling - Packaged	Packaged AC - 3 tons, Tier 2	491	5	0.5	5	0.0		\$345	18	\$/unit	\$345	1	15	15	18	\$23.00	\$0.0468	3.44	2.95
326	2	Space Cooling - Packaged	Packaged AC - 7.5 tons, Tier 2	1,115	5	1.2	5	0.0		\$683	18	\$/unit	\$683	1	15	15	18	\$45.50	\$0.0408	3.95	3.39
327	2	Space Cooling - Packaged	Packaged AC - 15 tons, Tier 2	2,550	5	2.8	5	0.0		\$1,485	18	\$/unit	\$1,485	1	15	15	18	\$99.00	\$0.0388	4.15	3.56
328	2	Space Cooling - Packaged	Ground Source Heat Pump - Cooling	5,585	9	4.1	26			\$33,000	9	\$/unit	\$33,000	1	15	15	21	\$2,200.00	\$0.3939	0.41	0.35
340			Space Cooling - Maintenance																		
341	1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 300 ton	15,200	5	16.5	5	0.0		\$5,100	5	\$/unit	\$5,100.00	1	10	10	5	\$510.00	\$0.0336	5.37	4.60
342	1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 500 ton	25,600	5	27.8	5	0.0		\$8,500	5	\$/unit	\$8,500.00	1	10	10	5	\$850.00	\$0.0332	5.43	4.65
343	1	Space Cooling - Maint.	DX Tune Up/ Advanced Diagnostics	1,200	5	1.3	5	0.0		\$340	5	\$/unit	\$340.00	1	2	2	5	\$170.00	\$0.1417	1.00	0.83
360			HVAC Controls																		
361	1	HVAC Controls	Retrocommissioning	1.2	1	0.0	26	0.0	1	\$0.09	10	\$/sq ft	\$0.09	1	7	7	10	\$0.01	\$0.0101	6.09	4.94
362	1	HVAC Controls	Programmable Thermostats	1,637	5	1.3	5			\$28	5	\$/unit	\$28	1	5	5	5	\$5.50	\$0.0034	17.54	14.45
363	1	HVAC Controls	EMS install	0.50	21	0.0	5	0.0	10	0.29	21	\$/sq ft	\$0.29	1	10	10	11	\$0.03	\$0.0584	1.74	1.38
364	1	HVAC Controls	EMS Optimization	0.05	9	0.0	26	0.0	10	0.06	9	\$/sq ft	\$0.06	1	5	5	3	\$0.01	\$0.2250	1.00	0.79
380			Ventilation																		
381	2	HVAC	Dual Enthalpy Economizer - from Fixed Damper	3,400	18	0.8	18			\$800	18	\$/unit	\$800	0.7	10	7	18	\$114.29	\$0.0336	3.20	2.63
382	2	HVAC	Dual Enthalpy Economizer - from Dry Bulb	2,500	18	0.6	18			\$400	18	\$/unit	\$400	0.7	10	7	18	\$57.14	\$0.0229	4.70	3.86
383	2	HVAC	Comprehensive Track Proper HVAC Sizing	1,000	18	0.0	18			\$225	9	\$/unit	\$225	1	15	15	18	\$15.00	\$0.0150	5.71	4.67
384	2	HVAC	Demand-Controlled Ventilation			0.0	26							1	10	10	18	\$0.00	#DIV/0!	N/A	N/A
385	2	HVAC	Heat Recovery	7	20	0.0	26			\$14	20	\$/sq ft	\$14	1	23	23		\$0.60	\$0.0855	0.76	0.62
386	2	HVAC	Fan Motor, 40hp, 1800rpm, 94.1%	2,354	5	0.4	5			\$286	5	\$/unit	\$286	1	12	12	5	\$23.83	\$0.0101	9.09	7.44
387	2	HVAC	Fan Motor, 15hp, 1800rpm, 92.4%	1,053	5	0.2	5			\$46	5	\$/unit	\$46	1	12	12	5	\$3.83	\$0.0036	25.27	20.68
388	2	HVAC	Fan Motor, 5hp, 1800rpm, 89.5%	393	5	0.1	5			\$34	5	\$/unit	\$34	1	12	12	5	\$2.83	\$0.0072	12.76	10.44
389	2	HVAC	Variable Speed Drive Control, 15 HP	12,000	5	1.9	5			\$3,465	5	\$/unit	\$3,465	1	20	20	5	\$173.25	\$0.0144	5.33	4.37
390	2	HVAC	Variable Speed Drive Control, 5 HP	4,000	5	0.6	5			\$1,925	5	\$/unit	\$1,925	1	20	20	5	\$96.25	\$0.0241	3.20	2.62
391	2	HVAC	Variable Speed Drive Control, 40 HP	32,000	5	5.0	5			\$6,280	5	\$/unit	\$6,280	1	20	20	5	\$314.00	\$0.0098	7.85	6.43
400			Motors																		
401	2	Motors	Efficient Motors	1,540	18	0.3	18			\$201	18	\$/unit	\$201	1	20	20	18	\$10.05	\$0.0065	11.80	9.67
402	2	Motors	Variable Frequency Drives (VFD)	4,833	18	4.6	18			\$3,600	18	\$/unit	\$3,600	1	15	15	18	\$240.00	\$0.0497	1.73	1.41
403	2	Motors	Variable Frequency Drives (VFD) for Environmental	20,120	18	2.3	18			\$3,361	18	\$/unit	\$3,361	1	12	12	18	\$280.08	\$0.0139	6.61	5.41
404	2	Motors	Efficient Environmental Remediation Motors	1,232	18	0.1	18			\$319	18	\$/unit	\$319	1	10	10	18	\$31.90	\$0.0259	3.76	3.08
405	2	Motors	Variable Frequency Drives (VFD) for Dairy Farms	7,469	18	2.8	18			\$2,500	18	\$/unit	\$2,500	1	10	10	18	\$250.00	\$0.0335	2.91	2.38

Vermont Energy Efficiency Potential Study  
Commercial Sector Measure Database

May 10, 2006 - Draft

#	Cost Type: 1=Full 2=Inc.	End Use	Measure Name	Annual kWh Savings	kWh Savings Source	kW demand savings	kW demand source	Annual MMBtu savings	MMBtu savings source	Incremental Cost	Cost Source	Cost/Unit Descriptor	Cost/Unit	Persistence Factor	Measure Life	Effective Measure Life	Measure Life Source	Annualized cost	Levelized cost per kWh saved	Societal Test	TRC Test
500			Lighting End Use																		
501	3	Lighting - Flor	Super T8 Fixture - from 34W T12	173	19	0.0	19	(0.0)	18	\$65	19	\$/unit	\$65	1	15	15	18	\$4.33	\$0.0250	2.89	2.28
502	2	Lighting - Flor	Super T8 Fixture - from standard T8	77	19	0.0	19	(0.0)	18	\$25	19	\$/unit	\$25	1	15	15	18	\$1.67	\$0.0217	3.28	2.92
503	2	Lighting - High Bay	T5 Fluorescent High-Bay Fixtures	418	18	0.1	18	(0.0)	18	\$100	19	\$/unit	\$100	1	15	15	18	\$6.67	\$0.0160	4.46	3.58
504	2	Lighting - Flor	T5 Troffer/Wrap	92	18	0.0	18	(0.0)	18	\$40	19	\$/unit	\$40	1	15	15	18	\$2.67	\$0.0289	2.46	1.97
505	2	Lighting - Flor	T5 Industrial Strip	84	18	0.0	18	(0.0)	18	\$40	19	\$/unit	\$40	1	15	15	18	\$2.67	\$0.0317	2.24	1.80
506	2	Lighting - Flor	T5 Indirect	92	18	0.0	18	(0.0)	18	\$40	19	\$/unit	\$40	1	15	15	18	\$2.67	\$0.0289	2.46	1.97
507	2	Lighting - Flor	CFL Fixture	197	18	0.1	18	(0.0)	18	\$35	18	\$/unit	\$35	1	15	15	18	\$2.33	\$0.0119	6.00	4.81
508	2	Lighting	Exterior HID	55	18	0.0	18		18	\$30	18	\$/unit	\$30	1	15	15	18	\$2.00	\$0.0363	1.96	1.57
509	2	Lighting	LED Exit Sign	88	18	0.0	18	(0.0)	18	\$25	18	\$/unit	\$25	1	10	10	18	\$2.50	\$0.0283	2.87	2.30
510	1	Lighting	Lighting Controls	291	18	0.1	18	(0.0)	18	\$55	18	\$/unit	\$55	1	10	10	18	\$5.50	\$0.0189	4.30	3.45
511	2	Lighting	LED Traffic / Pedestrian Signals	354	18	0.1	18		18	\$140	18	\$/unit	\$140	1	10	10	18	\$14.00	\$0.0396	2.06	1.65
512	2	Lighting - High Bay	Electronic HID Fixture Upgrade	385	19	0.1	19	(0.0)	18	\$100	19	\$/unit	\$100	1	15	15	19	\$6.67	\$0.0173	4.11	3.30
513	2	Lighting	Halogen Infra-Red Bulb	52	19	0.0	19	(0.0)	19	\$6	19	\$/unit	\$6	1	1.3	1.303781	19	\$4.60	\$0.0893	1.42	1.17
514	2	Lighting	Integrated Ballast MH 25W	223	19	0.1	19	(0.0)	19	\$40	19	\$/unit	\$40	1	3.4	3.422425	19	\$11.69	\$0.0523	2.18	1.78
515	2	Lighting	Induction Fluorescent 23W	230	19	0.1	19	(0.0)	19	\$22	19	\$/unit	\$22	1	4.9	4.8891786	19	\$4.50	\$0.0195	5.21	4.23
516	2	Lighting	CFL Screw-in	155	18	0.1	18	(0.0)	18	\$13	18	\$/unit	\$13	1	3.4	3.4	18	\$3.82	\$0.0247	4.61	3.78
517	2	Lighting	Dairy Farm Hard-Wired Vapor-Proof CFL Fixture with	85	18	0.0	18			\$70	18	\$/unit	\$70	0.67	15	10.05	18	\$6.97	\$0.0822	0.99	0.79
518	2	Lighting	Dairy Farm Vapor Proof T8 Fixture with Electronic Ball	196	18	0.1	18			\$70	19	\$/unit	\$70	1	15	15	18	\$4.67	\$0.0238	2.99	2.40
519	2	Lighting	Metal Halide Track	360	18	0.1	18	(0.0)	18	\$150	18	\$/unit	\$150	1	15	15	18	\$10.00	\$0.0278	2.56	2.06
520	2	Lighting	Lighting Power Density	17,100	18	4.5	18	(0.0)	18	\$1	18	\$/unit	\$1	1	20	20	18	\$0.06	\$0.0000	NA	NA
550			Lighting Controls																		
551	1	Lighting Controls	Bi-Level Switching	83	19	0.0	19	(0.0)	19	\$40	19	\$/unit	\$40	1	10	10	18	\$4.00	\$0.0481	1.69	1.36
552	1	Lighting Controls	Occupancy Sensors	302	5	0.1	5			\$55	18	\$/unit	\$55	1	10	10	18	\$5.50	\$0.0182	4.47	3.59
553	1	Lighting Controls	Daylight Dimming	353	5	0.1	5			\$288	5	\$/unit	\$288	1	10	10	18	\$28.80	\$0.0816	1.11	0.89
554	1	Lighting Controls	Daylight Dimming - New Construction	252	5	0.1	5			\$288	5	\$/unit	\$288	1	10	10	18	\$28.80	\$0.1143	0.71	0.64
555	2	Lighting Controls	5% More Efficient Design	9,000	5	2.1	5			\$4,000	5	\$/unit	\$4,000	1	20	20	5	\$200.00	\$0.0222	2.88	2.31
556	2	Lighting Controls	10% More Efficient Design	18,000	5	4.1	5			\$8,000	5	\$/unit	\$8,000	1	20	20	5	\$400.00	\$0.0222	2.88	2.31
557	1	Lighting Controls	15% More Efficient Design - New Construction	27,000	5	6.2	5			\$4,000	5	\$/unit	\$4,000	1	20	20	5	\$200.00	\$0.0074	8.64	6.93
558	1	Lighting Controls	30% More Efficient Design - New Construction	54,000	5	12.3	5			\$8,000	5	\$/unit	\$8,000	1	20	20	5	\$400.00	\$0.0074	8.64	6.93
600			Refrigeration End Use																		
601	1	Refrigeration	Vending Miser for Soft Drink Vending Machines	1,635	18	0.2	18			\$160	18	\$/unit	\$160	0.7	15	10	18	\$16.00	\$0.0098	11.16	9.24
602	2	Refrigeration	Refrigerated Case Covers	2,900	18	0.3	18			\$90	18	\$/unit	\$90	1	4	4	18	\$22.50	\$0.0078	17.64	14.69
603	1	Refrigeration	Refrigeration Economizer	600	18	0.2	18			\$2,558	18	\$/unit	\$2,558	1	15	15	18	\$170.53	\$0.2842	0.34	0.28
604	1	Refrigeration	Commercial Reach-In Refrigerators	800	18	0.1	18			\$100	18	\$/unit	\$100	1	9	9	18	\$11.11	\$0.0139	8.10	6.70
605	1	Refrigeration	Commercial Reach-In Freezer	700	18	0.1	18			\$100	18	\$/unit	\$100	1	9	9	18	\$11.11	\$0.0159	7.09	5.87
606	1	Refrigeration	Commercial Ice-makers	300	18	0.1	18			\$45	18	\$/unit	\$45	1	9	9	18	\$5.00	\$0.0167	6.74	5.58
607	2	Refrigeration	Evaporator Fan Motor Controls	2,600	18	0.3	18			\$2,254	18	\$/unit	\$2,254	1	15	15	18	\$150.27	\$0.0578	1.68	1.39
608	2	Refrigeration	Permanent Split Capacitor Motor	550	18	0.1	18			\$235	18	\$/unit	\$235	1	15	15	18	\$15.67	\$0.0285	3.40	2.81
609	2	Refrigeration	Zero-Energy Doors	800	18	0.1	18			\$800	18	\$/unit	\$800	1	10	10	18	\$80.00	\$0.1000	1.21	1.01
610	1	Refrigeration	Door Heater Controls	3,500	18	0.7	18			\$500	18	\$/unit	\$500	1	10	10	18	\$50.00	\$0.0143	7.65	6.33
611	2	Refrigeration	Discus and Scroll Compressors	1,500	18	0.3	18			\$650	18	\$/unit	\$650	1	13	13	18	\$50.00	\$0.0333	3.04	2.51
612	1	Refrigeration	Floating Head Pressure Control	2,000	18	0.3	18			\$734	18	\$/unit	\$734	1	10	10	18	\$73.40	\$0.0367	2.98	2.46
613	1	Refrigeration	Anti-sweat (humidistat) controls (refrigerator)	190	5	0.0	5			\$6,500	5	\$/unit	\$6,500	1	12	12	19	\$541.67	\$2.8509	0.04	0.03
614	1	Refrigeration	Anti-sweat (humidistat) controls (freezer)	375	5	0.1	5			\$6,500	5	\$/unit	\$6,500	1	12	12	19	\$541.67	\$1.4444	0.07	0.06
615	2	Refrigeration	High Efficiency Ice Maker	437	18	0.1	18			\$45	18	\$/unit	\$45	1	9	9	18	\$5.00	\$0.0114	9.82	8.13
700			Compressed Air End Use																		
701	2	C Air	Compressed Air – Non-Controls	13,473	22	1.5	23			\$1,347	23	\$/unit	\$1,347	1	7	7	GDS	\$192.43	\$0.0143	7.60	6.25
702	1	C Air	Compressed Air – Controls	10,064	23	1.1	18, 22			\$4,313	23	\$/unit	\$4,313	0.85	7	5.95	GDS	\$724.87	\$0.0720	1.57	1.29
720			Snow Making End Use																		
721	2	Snow making	Snow Making	3,357	9	22.4	9	38	% diesel eng	\$2,500	9	\$/unit	\$2,500	1	10	10	9	\$250.00	\$0.0745	1.32	1.08
740			Monitor Power Management																		
741	1	Monitors	EZ Save Monitor Power Management Software	30	18	0.1	18			\$26		\$/unit	\$26	0.85	2	1.7	18	\$15.53	\$0.5176	0.27	0.23
760			Water/Wastewater Treatment																		
761	1	Pumping and aeration	Improved equipment and controls	158,000	9	18.0	9			\$75,200	9	\$/unit	\$75,200	1	17	17	17	\$4,423.53	\$0.0280	2.93	2.40
780			Transformer End Use																		
781	2	Transformer	Energy Star Transformers	4,853	18	0.6	18			\$856		\$/unit	\$856	1	30	30	18	\$28.53	\$0.0059	10.75	8.82
800			Dairy Farms																		
801	1	Dairy Farms	VFDs for Milk Transfer Pumps	8000	18	3.0	18	0.0		\$2,230	18	\$/unit	\$2,230	1	10	10	18	\$223.00	\$0.0279	3.56	2.91
802	1	Dairy Farms	VFDs for Milk Vacuum Pumps	7,300	18	1.7	18	0.0		\$1,875	18	\$/unit	\$1,875	1	10	10	18	\$187.50	\$0.0257	3.87	3.16

Vermont Energy Efficiency Potential Study

Commercial Sector Measure Database

#	Cost Type: 1=Full 2=Inc.	End Use	Measure Name
100			<i>Space Heating</i>
101	2	Space Heating	High Efficiency Heat Pump
102	2	Space Heating	Hydronic Heating Pump
103	2	Space Heating	Ground Source Heat Pump - Heating
150			<i>Water Heating End Use</i>
151	2	Water Heating	Heat Pump Water Heater
152	2	Water Heating	Booster Water Heater
153	1	Water Heating	Point of Use Water Heater
154	1	Water Heating	Solar Water Heating System
155	1	Water Heating	Solar Pool Heating
200			<i>Envelope</i>
201	2	Space Heating	Integrated Building Design
202	2	Space Heating	Double Pane Low Emissivity Windows
300			<i>Space Cooling - Chillers</i>
301	2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 300 tons
302	2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 500 tons
303	2	Space Cooling - Chillers	Centrifugal Chiller, Optimal Design, 0.4 kW/ton, 500 to
320			<i>Space Cooling - Packaged AC</i>
321	2	Space Cooling - Packaged	Electric HVAC
322	2	Space Cooling - Packaged	DX Packaged system EER = 10.9, 10 tons
323	2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, <20 Tons
324	2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, >20 Tons
325	2	Space Cooling - Packaged	Packaged AC - 3 tons, Tier 2
326	2	Space Cooling - Packaged	Packaged AC - 7.5 tons, Tier 2
327	2	Space Cooling - Packaged	Packaged AC - 15 tons, Tier 2
328	2	Space Cooling - Packaged	Ground Source Heat Pump - Cooling
340			<i>Space Cooling - Maintenance</i>
341	1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 300 ton
342	1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 500 ton
343	1	Space Cooling - Maint.	DX Tune Up/ Advanced Diagnostics
360			<i>HVAC Controls</i>
361	1	HVAC Controls	Retrocommissioning
362	1	HVAC Controls	Programmable Thermostats
363	1	HVAC Controls	EMS install
364	1	HVAC Controls	EMS Optimization
380			<i>Ventilation</i>
381	2	HVAC	Dual Enthalpy Economizer - from Fixed Damper
382	2	HVAC	Dual Enthalpy Economizer - from Dry Bulb
383	2	HVAC	Comprehensive Track Proper HVAC Sizing
384	2	HVAC	Demand-Controlled Ventilation
385	2	HVAC	Heat Recovery
386	2	HVAC	Fan Motor, 40hp, 1800rpm, 94.1%
387	2	HVAC	Fan Motor, 15hp, 1800rpm, 92.4%
388	2	HVAC	Fan Motor, 5hp, 1800rpm, 89.5%
389	2	HVAC	Variable Speed Drive Control, 15 HP
390	2	HVAC	Variable Speed Drive Control, 5 HP
391	2	HVAC	Variable Speed Drive Control, 40 HP
400			<i>Motors</i>
401	2	Motors	Efficient Motors
402	2	Motors	Variable Frequency Drives (VFD)
403	2	Motors	Variable Frequency Drives (VFD) for Environmental
404	2	Motors	Efficient Environmental Remediation Motors
405	2	Motors	Variable Frequency Drives (VFD) for Dairy Farms

Cost Units by Building Type									
Dairy	Light Manufac	Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other
8,000	7,400	8,289	5,950	19,432	43,370	29,722	10,000	54,290	38,176
2	1	2	1	4	5	5	2	5	5
1	1	1	1	1	1	1	1	1	1
0.5	0.5	0.6	0.4	1.3	2.9	2.0	0.7	3.6	2.5
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
2	1	2	1	4	9	6	2	11	8
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
800	740	1,575	833	3,109	4,337	2,972	1,400	6,515	4,581
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
3	3	3	2	8	17	12	4	22	15
2	1	2	1	4	9	6	2	11	8
1	1	1	1	3	6	4	1	7	5
1	1	1	1	2	4	3	1	5	4
5	5	6	4	13	29	20	7	36	25
2	2	2	2	5	12	8	3	14	10
1	1	1	1	3	6	4	1	7	5
0.5	0.5	0.6	0.4	1.3	2.9	2.0	0.7	3.6	2.5
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
8,000	7,400	8,289	5,950	19,432	43,370	29,722	10,000	54,290	38,176
1	2	3	2	4	15	2	25	35	12
8,000	7,400	8,289	5,950	19,432	43,370	29,722	10,000	54,290	38,176
8,000	7,400	8,289	5,950	19,432	43,370	29,722	10,000	54,290	38,176
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
2	2	2	2	5	12	8	3	14	10
8,000	7,400	8,289	5,950	19,432	43,370	29,722	10,000	54,290	38,176
0	0	0	0	0	2	1	0	2	1
0	0	0	0	1	3	2	0	3	2
1	1	1	1	2	4	3	1	4	3
0	0	0	0	1	3	2	0	3	2
1	1	1	1	2	4	3	1	4	3
0	0	0	0	0	2	1	0	2	1
1	10	1	4	1	5	1	10	5	2
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1

Vermont Energy Efficiency Potential Study

Commercial Sector Measure Database

#	Cost Type: 1=Full 2=Inc.	End Use	Measure Name
500			<b>Lighting End Use</b>
501	3	Lighting - Flor	Super T8 Fixture - from 34W T12
502	2	Lighting - Flor	Super T8 Fixture - from standard T8
503	2	Lighting - High Bay	T5 Fluorescent High-Bay Fixtures
504	2	Lighting - Flor	T5 Troffer/Wrap
505	2	Lighting - Flor	T5 Industrial Strip
506	2	Lighting - Flor	T5 Indirect
507	2	Lighting - Flor	CFL Fixture
508	2	Lighting	Exterior HID
509	2	Lighting	LED Exit Sign
510	1	Lighting	Lighting Controls
511	2	Lighting	LED Traffic / Pedestrian Signals
512	2	Lighting - High Bay	Electronic HID Fixture Upgrade
513	2	Lighting	Halogen Infra-Red Bulb
514	2	Lighting	Integrated Ballast MH 25W
515	2	Lighting	Induction Fluorescent 23W
516	2	Lighting	CFL Screw-in
517	2	Lighting	Dairy Farm Hard-Wired Vapor-Proof CFL Fixture with I
518	2	Lighting	Dairy Farm Vapor Proof T8 Fixture with Electronic Ball
519	2	Lighting	Metal Halide Track
520	2	Lighting	Lighting Power Density
550			<b>Lighting Controls</b>
551	1	Lighting Controls	Bi-Level Switching
552	1	Lighting Controls	Occupancy Sensors
553	1	Lighting Controls	Daylight Dimming
554	1	Lighting Controls	Daylight Dimming - New Construction
555	2	Lighting Controls	5% More Efficient Design
556	2	Lighting Controls	10% More Efficient Design
557	1	Lighting Controls	15% More Efficient Design - New Construction
558	1	Lighting Controls	30% More Efficient Design - New Construction
600			<b>Refrigeration End Use</b>
601	1	Refrigeration	Vending Miser for Soft Drink Vending Machines
602	2	Refrigeration	Refrigerated Case Covers
603	1	Refrigeration	Refrigeration Economizer
604	1	Refrigeration	Commercial Reach-In Refrigerators
605	1	Refrigeration	Commercial Reach-In Freezer
606	1	Refrigeration	Commercial Ice-makers
607	2	Refrigeration	Evaporator Fan Motor Controls
608	2	Refrigeration	Permanent Split Capacitor Motor
609	2	Refrigeration	Zero-Energy Doors
610	1	Refrigeration	Door Heater Controls
611	2	Refrigeration	Discus and Scroll Compressors
612	1	Refrigeration	Floating Head Pressure Control
613	1	Refrigeration	Anti-sweat (humidistat) controls (refrigerator)
614	1	Refrigeration	Anti-sweat (humidistat) controls (freezer)
615	2	Refrigeration	High Efficiency Ice Maker
700			<b>Compressed Air End Use</b>
701	2	C Air	Compressed Air – Non-Controls
702	1	C Air	Compressed Air – Controls
720			<b>Snow Making End Use</b>
721	2	Snow making	Snow Making
740			<b>Monitor Power Management</b>
741	1	Monitors	EZ Save Monitor Power Management Software
760			<b>Water/Wastewater Treatment</b>
761	1	Pumping and aeration	Improved equipment and controls
780			<b>Transformer End Use</b>
781	2	Transformer	Energy Star Transformers
800			<b>Dairy Farms</b>
801	1	Dairy Farms	VFDs for Milk Transfer Pumps
802	1	Dairy Farms	VFDs for Milk Vacuum Pumps

Cost Units by Building Type									
Dairy	Light Manufac	Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other
38	57	74	53	116	258	177	66	388	250
38	57	74	53	116	258	177	66	388	250
13	19	25	18	39	87	59	22	130	84
56	84	109	78	170	380	260	96	570	367
56	84	109	78	170	380	260	96	570	367
56	84	109	78	170	380	260	96	570	367
64	59	66	48	155	347	238	80	434	305
21	20	22	16	52	116	79	27	145	102
8	7	8	6	19	43	30	10	54	38
0	0	0	0	0	0	0	0	0	1
2	2	2	2	5	12	8	3	15	11
31	29	32	23	75	168	115	39	210	148
74	69	77	55	180	403	276	93	504	354
81	75	84	60	196	438	300	101	548	385
93	86	96	69	225	503	345	116	630	443
25	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0
24	22	25	18	58	129	88	30	162	114
1	1	1	1	1	1	1	1	1	1
38	57	74	53	116	258	177	66	388	250
8	7	8	6	19	43	30	10	54	38
4	6	7	5	12	26	18	7	39	25
4	6	7	5	12	26	18	7	39	25
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
2	2	2	1	4	18	6	2	11	8
1	1	1	2	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	2	1	1	1	1	1	1
1	1	1	2	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	2	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	15	0	0
2	6	6	6	65	6	20	6	25	6
0	0	0	0	0	0	0	0	0	1
1	1	1	1	1	1	1	1	1	1
1	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0



Vermont Energy Efficiency Potential Study

Commercial Sector Measure Database

				Total Installed Cost Per Prototypical Building									
#	Cost Type: 1=Full 2=Inc.	End Use	Measure Name	Dairy	Light Manufac	Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other
100			Space Heating	1	2	3	4	5	6	7	8	9	\$10
101	2	Space Heating	High Efficiency Heat Pump	\$95	\$48	\$95	\$48	\$190	\$238	\$238	\$95	\$238	\$238
102	2	Space Heating	Hydronic Heating Pump	\$3,465	\$3,465	\$3,465	\$3,465	\$3,465	\$3,465	\$3,465	\$3,465	\$3,465	\$3,465
103	2	Space Heating	Ground Source Heat Pump - Heating	\$16,500	\$16,500	\$19,800	\$13,200	\$42,900	\$95,700	\$66,000	\$23,100	\$118,800	\$82,500
150			Water Heating End Use	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
151	2	Water Heating	Heat Pump Water Heater	\$4,067	\$4,067	\$4,067	\$4,067	\$4,067	\$4,067	\$4,067	\$4,067	\$4,067	\$4,067
152	2	Water Heating	Booster Water Heater	\$951	\$951	\$951	\$951	\$951	\$951	\$951	\$951	\$951	\$951
153	1	Water Heating	Point of Use Water Heater	\$214	\$107	\$214	\$107	\$428	\$962	\$641	\$214	\$1,176	\$855
154	1	Water Heating	Solar Water Heating System	\$11,500	\$11,500	\$11,500	\$11,500	\$11,500	\$11,500	\$11,500	\$11,500	\$11,500	\$11,500
155	1	Water Heating	Solar Pool Heating	\$33,750	\$33,750	\$33,750	\$33,750	\$33,750	\$33,750	\$33,750	\$33,750	\$33,750	\$33,750
200			Envelope	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
201	2	Space Heating	Integrated Building Design	\$166,226	\$166,226	\$166,226	\$166,226	\$166,226	\$166,226	\$166,226	\$166,226	\$166,226	\$166,226
202	2	Space Heating	Double Pane Low Emissivity Windows	\$408	\$377	\$803	\$425	\$1,586	\$2,212	\$1,516	\$714	\$3,323	\$2,336
300			Space Cooling - Chillers	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
301	2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 300 tons	\$16,200	\$16,200	\$16,200	\$16,200	\$16,200	\$16,200	\$16,200	\$16,200	\$16,200	\$16,200
302	2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 500 tons	\$27,000	\$27,000	\$27,000	\$27,000	\$27,000	\$27,000	\$27,000	\$27,000	\$27,000	\$27,000
303	2	Space Cooling - Chillers	Centrifugal Chiller, Optimal Design, 0.4 kW/ton, 500 to	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
320			Space Cooling - Packaged AC	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
321	2	Space Cooling - Packaged	Electric HVAC	\$1,500	\$1,500	\$1,500	\$1,000	\$4,000	\$8,500	\$6,000	\$2,000	\$11,000	\$7,500
322	2	Space Cooling - Packaged	DX Packaged system EER = 10.9, 10 tons	\$1,214	\$607	\$1,214	\$607	\$2,428	\$5,463	\$3,642	\$1,214	\$6,677	\$4,856
323	2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, <20 Tons	\$612	\$612	\$612	\$612	\$1,836	\$3,672	\$2,448	\$612	\$4,284	\$3,060
324	2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, >20 Tons	\$1,813	\$1,813	\$1,813	\$1,813	\$3,626	\$7,252	\$5,439	\$1,813	\$9,065	\$7,252
325	2	Space Cooling - Packaged	Packaged AC - 3 tons, Tier 2	\$1,725	\$1,725	\$2,070	\$1,380	\$4,485	\$10,005	\$6,900	\$2,415	\$12,420	\$8,625
326	2	Space Cooling - Packaged	Packaged AC - 7.5 tons, Tier 2	\$1,365	\$1,365	\$1,365	\$1,365	\$3,413	\$8,190	\$5,460	\$2,048	\$9,555	\$6,825
327	2	Space Cooling - Packaged	Packaged AC - 15 tons, Tier 2	\$1,485	\$1,485	\$1,485	\$1,485	\$4,455	\$8,910	\$5,940	\$1,485	\$10,395	\$7,425
328	2	Space Cooling - Packaged	Ground Source Heat Pump - Cooling	\$16,500	\$16,500	\$19,800	\$13,200	\$42,900	\$95,700	\$66,000	\$23,100	\$118,800	\$82,500
340			Space Cooling - Maintenance	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
341	1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 300 ton	\$5,100	\$5,100	\$5,100	\$5,100	\$5,100	\$5,100	\$5,100	\$5,100	\$5,100	\$5,100
342	1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 500 ton	\$8,500	\$8,500	\$8,500	\$8,500	\$8,500	\$8,500	\$8,500	\$8,500	\$8,500	\$8,500
343	1	Space Cooling - Maint.	DX Tune Up/ Advanced Diagnostics	\$340	\$340	\$340	\$340	\$340	\$340	\$340	\$340	\$340	\$340
360			HVAC Controls	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
361	1	HVAC Controls	Retrocommissioning	\$680	\$629	\$705	\$506	\$1,652	\$3,686	\$2,526	\$850	\$4,615	\$3,245
362	1	HVAC Controls	Programmable Thermostats	\$28	\$55	\$83	\$55	\$110	\$413	\$55	\$688	\$963	\$330
363	1	HVAC Controls	EMS install	\$2,337	\$2,162	\$2,422	\$1,738	\$5,678	\$12,672	\$8,684	\$2,922	\$15,862	\$11,154
364	1	HVAC Controls	EMS Optimization	\$450	\$416	\$466	\$335	\$1,093	\$2,440	\$1,672	\$563	\$3,054	\$2,147
380			Ventilation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
381	2	HVAC	Dual Enthalpy Economizer - from Fixed Damper	\$800	\$800	\$800	\$800	\$800	\$800	\$800	\$800	\$800	\$800
382	2	HVAC	Dual Enthalpy Economizer - from Dry Bulb	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400
383	2	HVAC	Comprehensive Track Proper HVAC Sizing	\$450	\$450	\$450	\$450	\$1,125	\$2,700	\$1,800	\$675	\$3,150	\$2,250
384	2	HVAC	Demand-Controlled Ventilation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
385	2	HVAC	Heat Recovery	\$110,345	\$102,069	\$114,338	\$82,069	\$268,031	\$598,212	\$409,962	\$137,931	\$748,832	\$526,572
386	2	HVAC	Fan Motor, 40hp, 1800rpm, 94.1%	\$0	\$0	\$0	\$0	\$0	\$572	\$286	\$0	\$572	\$286
387	2	HVAC	Fan Motor, 15hp, 1800rpm, 92.4%	\$0	\$0	\$0	\$0	\$46	\$138	\$92	\$0	\$138	\$92
388	2	HVAC	Fan Motor, 5hp, 1800rpm, 89.5%	\$34	\$34	\$34	\$34	\$68	\$136	\$102	\$34	\$136	\$102
389	2	HVAC	Variable Speed Drive Control, 15 HP	\$0	\$0	\$0	\$0	\$3,465	\$10,395	\$6,930	\$0	\$10,395	\$6,930
390	2	HVAC	Variable Speed Drive Control, 5 HP	\$1,925	\$1,925	\$1,925	\$1,925	\$3,850	\$7,700	\$5,775	\$1,925	\$7,700	\$5,775
391	2	HVAC	Variable Speed Drive Control, 40 HP	\$0	\$0	\$0	\$0	\$0	\$12,560	\$6,280	\$0	\$12,560	\$6,280
400			Motors	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
401	2	Motors	Efficient Motors	\$201	\$2,010	\$201	\$804	\$201	\$1,005	\$201	\$2,010	\$1,005	\$402
402	2	Motors	Variable Frequency Drives (VFD)	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600	\$3,600
403	2	Motors	Variable Frequency Drives (VFD) for Environmental	\$3,361	\$3,361	\$3,361	\$3,361	\$3,361	\$3,361	\$3,361	\$3,361	\$3,361	\$3,361
404	2	Motors	Efficient Environmental Remediation Motors	\$319	\$319	\$319	\$319	\$319	\$319	\$319	\$319	\$319	\$319
405	2	Motors	Variable Frequency Drives (VFD) for Dairy Farms	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500

Vermont Energy Efficiency Potential Study

Commercial Sector Measure Database

				Total Installed Cost Per Prototypical Building									
#	Cost Type: 1=Full 2=Inc.	End Use	Measure Name	Dairy	Light Manufac	Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other
500			Lighting End Use	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
501	3	Lighting - Flor	Super T8 Fixture - from 34W T12	\$2,475	\$3,713	\$4,805	\$3,458	\$7,535	\$16,780	\$11,502	\$4,259	\$25,225	\$16,271
502	2	Lighting - Flor	Super T8 Fixture - from standard T8	\$952	\$1,428	\$1,848	\$1,330	\$2,898	\$6,454	\$4,424	\$1,638	\$9,702	\$6,258
503	2	Lighting - High Bay	T5 Fluorescent High-Bay Fixtures	\$1,288	\$1,904	\$2,464	\$1,792	\$3,864	\$8,680	\$5,936	\$2,184	\$13,048	\$8,400
504	2	Lighting - Flor	T5 Troffer/Wrap	\$2,240	\$3,360	\$4,346	\$3,114	\$6,810	\$15,187	\$10,394	\$3,853	\$22,803	\$14,694
505	2	Lighting - Flor	T5 Industrial Strip	\$2,240	\$3,360	\$4,346	\$3,114	\$6,810	\$15,187	\$10,394	\$3,853	\$22,803	\$14,694
506	2	Lighting - Flor	T5 Indirect	\$2,240	\$3,360	\$4,346	\$3,114	\$6,810	\$15,187	\$10,394	\$3,853	\$22,803	\$14,694
507	2	Lighting - Flor	CFL Fixture	\$2,243	\$2,071	\$2,324	\$1,665	\$5,440	\$12,139	\$8,323	\$2,801	\$15,205	\$10,688
508	2	Lighting	Exterior HID	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
509	2	Lighting	LED Exit Sign	\$533	\$493	\$553	\$397	\$1,296	\$2,891	\$1,982	\$667	\$3,619	\$2,545
510	1	Lighting	Lighting Controls	\$440	\$385	\$440	\$330	\$1,045	\$2,365	\$1,650	\$550	\$2,970	\$2,090
511	2	Lighting	LED Traffic / Pedestrian Signals	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$140
512	2	Lighting - High Bay	Electronic HID Fixture Upgrade	\$228	\$204	\$228	\$168	\$540	\$1,212	\$828	\$276	\$1,512	\$1,068
513	2	Lighting	Halogen Infra-Red Bulb	\$186	\$172	\$193	\$137	\$451	\$1,006	\$689	\$231	\$1,260	\$886
514	2	Lighting	Integrated Ballast MH 25W	\$2,970	\$2,749	\$3,074	\$2,204	\$7,215	\$16,101	\$11,032	\$3,712	\$20,149	\$14,175
515	2	Lighting	Induction Fluorescent 23W	\$1,774	\$1,640	\$1,837	\$1,321	\$4,313	\$9,627	\$6,597	\$2,220	\$12,045	\$8,473
516	2	Lighting	CFL Screw-in	\$1,206	\$1,116	\$1,252	\$897	\$2,929	\$6,541	\$4,483	\$1,508	\$8,188	\$5,757
517	2	Lighting	Dairy Farm Hard-Wired Vapor-Proof CFL Fixture with	\$1,750	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
518	2	Lighting	Dairy Farm Vapor Proof T8 Fixture with Electronic Ball	\$2,450	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
519	2	Lighting	Metal Halide Track	\$3,567	\$3,306	\$3,698	\$2,654	\$8,657	\$19,358	\$13,268	\$4,481	\$24,230	\$17,052
520	2	Lighting	Lighting Power Density	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1
550			Lighting Controls	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
551	1	Lighting Controls	Bi-Level Switching	\$1,523	\$2,285	\$2,957	\$2,128	\$4,637	\$10,326	\$7,078	\$2,621	\$15,523	\$10,013
552	1	Lighting Controls	Occupancy Sensors	\$440	\$385	\$440	\$330	\$1,045	\$2,365	\$1,650	\$550	\$2,970	\$2,090
553	1	Lighting Controls	Daylight Dimming	\$1,152	\$1,728	\$2,016	\$1,440	\$3,456	\$7,488	\$5,184	\$2,016	\$11,232	\$7,200
554	1	Lighting Controls	Daylight Dimming - New Construction	\$1,152	\$1,728	\$2,016	\$1,440	\$3,456	\$7,488	\$5,184	\$2,016	\$11,232	\$7,200
555	2	Lighting Controls	5% More Efficient Design	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
556	2	Lighting Controls	10% More Efficient Design	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
557	1	Lighting Controls	15% More Efficient Design - New Construction	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000	\$4,000
558	1	Lighting Controls	30% More Efficient Design - New Construction	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
600			Refrigeration End Use	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
601	1	Refrigeration	Vending Miser for Soft Drink Vending Machines	\$320	\$320	\$320	\$160	\$640	\$2,880	\$960	\$320	\$1,760	\$1,280
602	2	Refrigeration	Refrigerated Case Covers	\$90	\$90	\$90	\$180	\$90	\$90	\$90	\$90	\$90	\$90
603	1	Refrigeration	Refrigeration Economizer	\$2,558	\$2,558	\$2,558	\$2,558	\$2,558	\$2,558	\$2,558	\$2,558	\$2,558	\$2,558
604	1	Refrigeration	Commercial Reach-In Refrigerators	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
605	1	Refrigeration	Commercial Reach-In Freezer	\$100	\$100	\$100	\$200	\$100	\$100	\$100	\$100	\$100	\$100
606	1	Refrigeration	Commercial Ice-makers	\$45	\$45	\$45	\$90	\$45	\$45	\$45	\$45	\$45	\$45
607	2	Refrigeration	Evaporator Fan Motor Controls	\$2,254	\$2,254	\$2,254	\$2,254	\$2,254	\$2,254	\$2,254	\$2,254	\$2,254	\$2,254
608	2	Refrigeration	Permanent Split Capacitor Motor	\$235	\$235	\$235	\$235	\$235	\$235	\$235	\$235	\$235	\$235
609	2	Refrigeration	Zero-Energy Doors	\$800	\$800	\$800	\$1,600	\$800	\$800	\$800	\$800	\$800	\$800
610	1	Refrigeration	Door Heater Controls	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$500
611	2	Refrigeration	Discus and Scroll Compressors	\$650	\$650	\$650	\$1,300	\$650	\$650	\$650	\$650	\$650	\$650
612	1	Refrigeration	Floating Head Pressure Control	\$734	\$734	\$734	\$734	\$734	\$734	\$734	\$734	\$734	\$734
613	1	Refrigeration	Anti-sweat (humidistat) controls (refrigerator)	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500
614	1	Refrigeration	Anti-sweat (humidistat) controls (freezer)	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500	\$6,500
615	2	Refrigeration	High Efficiency Ice Maker	\$45	\$45	\$45	\$45	\$45	\$45	\$45	\$45	\$45	\$45
700			Compressed Air End Use	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
701	2	C Air	Compressed Air – Non-Controls	\$1,347	\$1,347	\$1,347	\$1,347	\$1,347	\$1,347	\$1,347	\$1,347	\$1,347	\$1,347
702	1	C Air	Compressed Air – Controls	\$4,313	\$4,313	\$4,313	\$4,313	\$4,313	\$4,313	\$4,313	\$4,313	\$4,313	\$4,313
720			Snow Making End Use	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
721	2	Snow making	Snow Making	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$37,500	\$0	\$0
740			Monitor Power Management	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
741	1	Monitors	EZ Save Monitor Power Management Software	\$53	\$158	\$158	\$158	\$1,716	\$158	\$528	\$158	\$660	\$158
760			Water/Wastewater Treatment	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
761	1	Pumping and aeration	Improved equipment and controls	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$75,200
780			Transformer End Use	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
781	2	Transformer	Energy Star Transformers	\$856	\$856	\$856	\$856	\$856	\$856	\$856	\$856	\$856	\$856
800			Dairy Farms	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
801	1	Dairy Farms	VFDs for Milk Transfer Pumps	\$2,230	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
802	1	Dairy Farms	VFDs for Milk Vacuum Pumps	\$1,875	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0

## Sources

- 1 American Council for an Energy Efficient Economy (ACEEE), Selecting Targets for Market Transformation Programs: A National Analysis, 1998.
- 2 California Statewide Commercial Sector Energy Efficiency Potential Study, July, 2002, C.1-3.
- 3 CALIFORNIA STATEWIDE COMMERCIAL SECTOR NATURAL GAS ENERGY EFFICIENCY POTENTIAL STUDY, Study ID #SW061, Prepared for Pacific Gas & Electric Company, Prepared by Mike Rufo and Fred Coito KEMA-XENERGY Inc., May 14, 2003
- 4 California Urban Water Conservation Council, <http://www.cuwcc.org/sprayvalves.lasso>
- 5 Independent Assessment of Conservation and Energy Efficiency Potential for Connecticut and the Southwest Connecticut Region, GDS Associates, June 2004
- 6 Database for Energy Efficient Resources (DEER) 2001 Update, California Energy Commission, <http://www.energy.ca.gov/deer/index.html>
- 7 EIA - Technology Forecast Updates - Residential and Commercial Building Technologies - Reference Case, September 2004, Navigant Consulting, Reference No. 117943
- 8 Federal Energy Management Program (FEMP) brochure: "How to Buy an Energy-Efficient Family-Sized Commercial Clothes Washer", [http://www.eere.energy.gov/femp/procurement/comm\\_clotheswashers.html#cost](http://www.eere.energy.gov/femp/procurement/comm_clotheswashers.html#cost)
- 9 GDS Associates Estimate/Calculation
- 10 The Maximum Achievable Cost Effective Potential for Natural Gas Energy Efficiency In the Service Territory of PNM, GDS Associates, May 2005
- 11 Keyspan Energy, 2004. Program data provided via email.
- 12 Maine Cost Effectiveness Model, March 2003.
- 13 National Grid, 2000 Energy Initiative Program Data, 2000 DSM Performance Measurement Report, Appendix 3, December 2001 15 hp motor (725 KWh per hp)
- 14 KeySpan Energy, 2005. Cost benefit analysis conducted for solar measures.
- 15 Northeast Utilities, Action Program C&I Persistence Study, Oct. 2001, p. 39
- 16 Quantum Consulting - Pilot program experience from Oakland CA per email communication from Mike Rufo on 2/3/04. and American Council for an Energy Efficient Economy (ACEEE), Selecting Targets for Market Transformation Programs: A National Analysis, 1998.
- 17 RS Means CostWorks 2005, construction cost estimating database for Albuquerque
- 18 Efficiency Vermont Technical Reference User Manual (TRM) No. 2004-31
- 19 Efficiency Vermont Technical Reference User Manual (TRM) Update - Portfolio of New and Revised Measures - Portfolio Update No. 38
- 20 WI Focus on Energy Cost Data (VA Hospital)
- 21 Energy Efficiency and Renewable Energy Resource Development Potential in New York State - Final Report, Volume 5 Energy Efficiency Technical Appendices, August 2003.
- 22 National Grid, RFP LJR 05-07, Prescriptive Compressed Air Impcat Study p. 10
- 23 NYSERDA final report for Agreement number 5035, Turnkey Pump and Compressed Air System Efficiency Program, Final Report, November 2003, p.12
- 24 Draft Final Report: Phase 2 Evaluation of the Efficiency Vermont Business Programs, December 2005.
- 25 Dairy Farm Energy Audit Summary Report for FlexTech Services, NYSERDA, July 2003.
- 26 GDS Benefit Cost Model with Vermont Avoided Costs
- 27 Email from Efficiency Vermont on March 12, 2006 responding to GDS questions on market penetrations of efficient measures.
- 28 Energy Trust of Oregon - personal communication, noted that they expect 20-50% savings from water and wastewater project.



## Vermont Energy Efficiency Potential Study - Base Case Factor

May 10, 2006 - Draft

					1	2	3	4	5	6	7	8	9	10	
	TRM Measure Number	Cost Type: 1=Full 2=Inc.				Light Manufac									
#			End Use	Measure Name	Dairy		Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other	Source
100				Space Heating											
101	I-L-1-a	2	Space Heating	High Efficiency Heat Pump	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
102		2	Space Heating	Hydronic Heating Pump	23%	23%	24%	23%	33%	23%	40%	23%	40%	23%	5
103		2	Space Heating	Ground Source Heat Pump - Heating	77%	77%	77%	77%	67%	77%	60%	77%	60%	77%	9
150	III-D-1-b	Act 250		Water Heating End Use											
151	I-K-1-a	2	Water Heating	Heat Pump Water Heater	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
152		2	Water Heating	Booster Water Heater	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
153		1	Water Heating	Point of Use Water Heater	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
154		1	Water Heating	Solar Water Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
155		1	Water Heating	Solar Pool Heating	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
200				Envelope											
201	I-M-1-a	2	Space Heating	Integrated Building Design	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
202		2	Space Heating	Double Pane Low Emissivity Windows	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
300				Space Cooling - Chillers											
301		2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 300 tons	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
302		2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 500 tons	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
303		2	Space Cooling - Chillers	Centrifugal Chiller, Optimal Design, 0.4 kW/ton, 500 tons	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
320				Space Cooling - Packaged AC											
321	I-B-1-g	2	Space Cooling - Packaged	Electric HVAC	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
322		2	Space Cooling - Packaged	DX Packaged system EER = 10.9, 10 tons	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
323		2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, <20 Tons	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
324		2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, >20 Tons	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
325		2	Space Cooling - Packaged	Packaged AC - 3 tons, Tier 2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
326		2	Space Cooling - Packaged	Packaged AC - 7.5 tons, Tier 2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
327		2	Space Cooling - Packaged	Packaged AC - 15 tons, Tier 2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
328		2	Space Cooling - Packaged	Ground Source Heat Pump - Cooling	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
340				Space Cooling - Maintenance											
341		1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 300 ton	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
342		1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 500 ton	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
343		1	Space Cooling - Maint.	DX Tune Up/ Advanced Diagnostics	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
360				HVAC Controls											
361		1	HVAC Controls	Retrocommissioning	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
362		1	HVAC Controls	Programmable Thermostats	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
363		1	HVAC Controls	EMS install	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
364		1	HVAC Controls	EMS Optimization	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
380				HVAC End Use											
381	I-B-2-c	2	HVAC	Dual Enthalpy Economizer - from Fixed Damper	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
382	I-B-2-c	2	HVAC	Dual Enthalpy Economizer - from Dry Bulb	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
383	I-A-3-a	2	HVAC	Comprehensive Track Proper HVAC Sizing	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
384	I-J-1-a	2	HVAC	Demand-Controlled Ventilation	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	5
385	BREC	2	HVAC	Heat Recovery	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	5
386	BREC	2	HVAC	Fan Motor, 40hp, 1800rpm, 94.1%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
387	BREC	2	HVAC	Fan Motor, 15hp, 1800rpm, 92.4%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
388	BREC	2	HVAC	Fan Motor, 5hp, 1800rpm, 89.5%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
389	BREC	2	HVAC	Variable Speed Drive Control, 15 HP	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	5
390	BREC	2	HVAC	Variable Speed Drive Control, 5 HP	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	5
391	BREC	2	HVAC	Variable Speed Drive Control, 40 HP	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	5
400				Motors End Use											
401	I-A-1-e	2	Motors	Efficient Motors	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
402	I-A-2-a	2	Motors	Variable Frequency Drives (VFD)	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	5
403	I-A-3-a	2	Motors	VFD for Environmental Remediation Projects	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
404	I-A-4-a	2	Motors	Efficient Environmental Remediation Motors	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
405	I-A-5-b	2	Motors	Variable Frequency Drives (VFD) for Dairy Farms	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
500				Lighting End Use											
501	I-C-12-d	2	Lighting	Super T8 Fixture - from 34W T12	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
502	I-C-12-d	2	Lighting	Super T8 Fixture - from Standard T8	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
503	I-C-14-a	2	Lighting	T5 Fluorescent High-Bay Fixtures	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	5
504	I-C-14-a	2	Lighting	T5 Troffer/Wrap	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
505	I-C-14-a	2	Lighting	T5 Industrial Strip	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
506	I-C-14-a	2	Lighting	T5 Indirect	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
507	I-C-2-e	2	Lighting	CFL Fixture	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	5
508	I-C-3-d	2	Lighting	Exterior HID	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5

## Vermont Energy Efficiency Potential Study - Base Case Factor

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#	TRM Measure Number	Cost Type: 1=Full 2=Inc.	End Use	Measure Name	1	2	3	4	5	6	7	8	9	10	Source
					Dairy	Light Manufac	Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other	
509	I-C-4-d	2	Lighting	LED Exit Sign	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5
510	I-C-5-g	1	Lighting	Lighting Controls	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
511	I-C-6-b	2	Lighting	LED Traffic / Pedestrian Signals	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	5
512	I-C-17-a	2	Lighting	Electronic HID Fixture Upgrade	12%	12%	12%	12%	12%	12%	12%	12%	12%	12%	5
513	I-C-15-a	2	Lighting	Halogen Infra-Red Bulb	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	5
514	I-C-16-a	2	Lighting	Integrated Ballast MH 25W	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	5
515	I-C-16-a	2	Lighting	Induction Fluorescent 23W	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	5
516	I-C-8-c	2	Lighting	CFL Screw-in	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	5
517	I-C-9-b	2	Lighting	Dairy Farm Hard-Wired Vapor-Proof CFL Fixture with Electronic Ballast	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	5
518	I-C-10-b	2	Lighting	Dairy Farm Vapor Proof T8 Fixture with Electronic Ballast	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
519	I-C-11-a	2	Lighting	Metal Halide Track	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	5
520	I-C-14-a	2	Lighting	Lighting Power Density	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
<b>550 Lighting Controls</b>															
551		1	Lighting Controls	Bi-Level Switching	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
552		1	Lighting Controls	Occupancy Sensors	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
553		1	Lighting Controls	Daylight Dimming	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
554		1	Lighting Controls	Daylight Dimming - New Construction	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
555		2	Lighting Controls	5% More Efficient Design	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
556		2	Lighting Controls	10% More Efficient Design	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
557		1	Lighting Controls	15% More Efficient Design - New Construction	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
558		1	Lighting Controls	30% More Efficient Design - New Construction	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
<b>600 Refrigeration End Use</b>															
601	I-E-1-b	1	Refrigeration	Vending Miser for Soft Drink Vending Machines	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5
602	I-E-2-a	2	Refrigeration	Refrigerated Case Covers	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
603	I-E-6-a	1	Refrigeration	Refrigeration Economizer	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
604	I-E-3-a	1	Refrigeration	Commercial Reach-In Refrigerators	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
605	I-E-4-a	1	Refrigeration	Commercial Reach-In Freezer	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	5
606	I-E-5-a	1	Refrigeration	Commercial Ice-makers	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5
607	I-E-7-a	2	Refrigeration	Evaporator Fan Motor Controls	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
608	I-E-8-a	2	Refrigeration	Permanent Split Capacitor Motor	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
609	I-E-9-a	2	Refrigeration	Zero-Energy Doors	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
610	I-E-10-a	1	Refrigeration	Door Heater Controls	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
611	I-E-11-a	2	Refrigeration	Discus and Scroll Compressors	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
612	I-E-12-a	1	Refrigeration	Floating Head Pressure Control	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
613		1	Refrigeration	Anti-sweat (humidistat) controls (refrigerator)	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
614		1	Refrigeration	Anti-sweat (humidistat) controls (freezer)	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	5
615	I-E-5-a	2	Refrigeration	High Efficiency Ice Maker	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	5
<b>700 Compressed Air End Use</b>															
701	I-F-1-b	2	C Air	Compressed Air - Non-Controls	0%	15%	0.25%	0%	0%	0%	0%	20.000%	0%	15%	9
702	I-F-2-b	1	C Air	Compressed Air - Controls	0%	15%	0.25%	0%	0%	0%	0%	20.000%	0%	15%	9
<b>720 Snow Making End Use</b>															
721	I-G-1-a	2	Snow making	Snow Making	0%	0%	0%	0%	0%	0%	0%	80%	0%	11%	9
<b>740 Office Equipment</b>															
741	I-H-1-a	1	Monitors	EZ Save Monitor Power Management Software	19%	19%	19%	19%	19%	19%	19%	19%	19%	19%	5
<b>760 Water/Wastewater Treatment</b>															
761	I-I-1-a	1	Pumping and aeration	Improved equipment and controls	0%	0%	0%	0%	0%	0%	0%	0%	0%	23%	9
<b>780 Transformer End Use</b>															
781	I-D-1-d	2	Transformer	Energy Star Transformers	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	5
<b>800 Dairy Farms</b>															
801	I-A-5-b	1	Dairy Farms	VFDs for Milk Transfer Pumps	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25
802		1	Dairy Farms	VFDs for Milk Vacuum Pumps	17%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25

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#	TRM Measure Number	Cost Type: 1=Full 2=Inc.	End Use	Measure Name	1	2	3	4	5	6	7	8	9	10	Source
					Dairy	Light Manufac	Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other	
100				<b>Space Heating</b>											
101	I-L-1-a	2	Space Heating	High Efficiency Heat Pump	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	21
102		2	Space Heating	Hydronic Heating Pump	34%	34%	34%	34%	34%	34%	34%	34%	34%	34%	5
103		2	Space Heating	Ground Source Heat Pump - Heating	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%	21
150	III-D-1-b	Act 250		<b>Water Heating End Use</b>											
151	I-K-1-a	2	Water Heating	Heat Pump Water Heater	43%	43%	43%	43%	43%	43%	43%	43%	43%	43%	
152		2	Water Heating	Booster Water Heater	13%	13%	13%	13%	13%	13%	13%	13%	13%	13%	21
153		1	Water Heating	Point of Use Water Heater	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	21
154		1	Water Heating	Solar Water Heating System	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	14
155		1	Water Heating	Solar Pool Heating	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	14
200				<b>Envelope</b>											
201	I-M-1-a	2	Space Heating	Integrated Building Design	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	21
202		2	Space Heating	Double Pane Low Emissivity Windows	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	21
300				<b>Space Cooling - Chillers</b>											
301		2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 300 tons	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	5
302		2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 500 tons	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	5
303		2	Space Cooling - Chillers	Centrifugal Chiller, Optimal Design, 0.4 kW/ton, 500 tons	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	5
320				<b>Space Cooling - Packaged AC</b>											
321	I-B-1-g	2	Space Cooling - Packaged	Electric HVAC	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
322		2	Space Cooling - Packaged	DX Packaged system EER = 10.9, 10 tons	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	5
323		2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, <20 Tons	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	5
324		2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, >20 Tons	17%	17%	17%	17%	17%	17%	17%	17%	17%	17%	5
325		2	Space Cooling - Packaged	Packaged AC - 3 tons, Tier 2	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	5
326		2	Space Cooling - Packaged	Packaged AC - 7.5 tons, Tier 2	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	5
327		2	Space Cooling - Packaged	Packaged AC - 15 tons, Tier 2	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%	5
328		2	Space Cooling - Packaged	Ground Source Heat Pump - Cooling	36%	36%	36%	36%	36%	36%	36%	36%	36%	36%	9
340				<b>Space Cooling - Maintenance</b>											
341		1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 300 ton	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	5
342		1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 500 ton	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	5
343		1	Space Cooling - Maint.	DX Tune Up/ Advanced Diagnostics	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	5
360				<b>HVAC Controls</b>											
361		1	HVAC Controls	Retrocommissioning	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	21
362		1	HVAC Controls	Programmable Thermostats	3%	4%	4%	3%	10%	4%	4%	4%	4%	4%	5
363		1	HVAC Controls	EMS install	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	21, 5
364		1	HVAC Controls	EMS Optimization	1%	1%	6%	8%	7%	1%	2%	1%	5%	1%	10
380				<b>HVAC End Use</b>											
381	I-B-2-c	2	HVAC	Dual Enthalpy Economizer - from Fixed Damper	22%	22%	22%	22%	22%	22%	22%	22%	22%	22%	21
382	I-B-2-c	2	HVAC	Dual Enthalpy Economizer - from Dry Bulb	16%	16%	16%	16%	16%	16%	16%	16%	16%	16%	9
383	I-A-3-a	2	HVAC	Comprehensive Track Proper HVAC Sizing	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	18
384	I-J-1-a	2	HVAC	Demand-Controlled Ventilation	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
385	BREC	2	HVAC	Heat Recovery	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
386	BREC	2	HVAC	Fan Motor, 40hp, 1800rpm, 94.1%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	12
387	BREC	2	HVAC	Fan Motor, 15hp, 1800rpm, 92.4%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	5
388	BREC	2	HVAC	Fan Motor, 5hp, 1800rpm, 89.5%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	12
389	BREC	2	HVAC	Variable Speed Drive Control, 15 HP	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	5
390	BREC	2	HVAC	Variable Speed Drive Control, 5 HP	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	5
391	BREC	2	HVAC	Variable Speed Drive Control, 40 HP	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	5
400				<b>Motors End Use</b>											
401	I-A-1-e	2	Motors	Efficient Motors	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	
402	I-A-2-a	2	Motors	Variable Frequency Drives (VFD)	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	
403	I-A-3-a	2	Motors	VFD for Environmental Remediation Projects	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.23%	18
404	I-A-4-a	2	Motors	Efficient Environmental Remediation Motors	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.01%	18
405	I-A-5-b	2	Motors	Variable Frequency Drives (VFD) for Dairy Farms	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.00%	
500				<b>Lighting End Use</b>											
501	I-C-12-d	2	Lighting	Super T8 Fixture - from 34W T12	43%	43%	43%	43%	43%	43%	43%	43%	43%	43%	5
502	I-C-12-d	2	Lighting	Super T8 Fixture - from standard T8	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	5
503	I-C-14-a	2	Lighting	T5 Fluorescent High-Bay Fixtures	49%	49%	49%	49%	49%	49%	49%	49%	49%	49%	5
504	I-C-14-a	2	Lighting	T5 Troffer/Wrap	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	19
505	I-C-14-a	2	Lighting	T5 Industrial Strip	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	19
506	I-C-14-a	2	Lighting	T5 Indirect	27%	27%	27%	27%	27%	27%	27%	27%	27%	27%	19
507	I-C-2-e	2	Lighting	CFL Fixture	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	21
508	I-C-3-d	2	Lighting	Exterior HID	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	18

## Vermont Energy Efficiency Potential Study - Savings Factor

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#	TRM Measure Number	Cost Type: 1=Full 2=Inc.	End Use	Measure Name	1	2	3	4	5	6	7	8	9	10	Source
					Dairy	Light Manufac	Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other	
509	I-C-4-d	2	Lighting	LED Exit Sign	82%	82%	82%	82%	82%	82%	82%	82%	82%	82%	18
510	I-C-5-g	1	Lighting	Lighting Controls	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	18
511	I-C-6-b	2	Lighting	LED Traffic / Pedestrian Signals	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	18
512	I-C-17-a	2	Lighting	Electronic HID Fixture Upgrade	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	19
513	I-C-15-a	2	Lighting	Halogen Infra-Red Bulb	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	19
514	I-C-16-a	2	Lighting	Integrated Ballast MH 25W	72%	72%	72%	72%	72%	72%	72%	72%	72%	72%	19
515	I-C-16-a	2	Lighting	Induction Fluorescent 23W	74%	74%	74%	74%	74%	74%	74%	74%	74%	74%	19
516	I-C-8-c	2	Lighting	CFL Screw-in	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	21
517	I-C-9-b	2	Lighting	Dairy Farm Hard-Wired Vapor-Proof CFL Fixture with Electronic Ballast	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	21
518	I-C-10-b	2	Lighting	Dairy Farm Vapor Proof T8 Fixture with Electronic Ballast	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%	5
519	I-C-11-a	2	Lighting	Metal Halide Track	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	18
520	I-C-14-a	2	Lighting	Lighting Power Density	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
<b>550</b>					<b>Lighting Controls</b>										
551		1	Lighting Controls	Bi-Level Switching	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	19
552		1	Lighting Controls	Occupancy Sensors	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	5
553		1	Lighting Controls	Daylight Dimming	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	5
554		1	Lighting Controls	Daylight Dimming - New Construction	35%	35%	35%	35%	35%	35%	35%	35%	35%	35%	5
555		2	Lighting Controls	5% More Efficient Design	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5
556		2	Lighting Controls	10% More Efficient Design	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	5
557		1	Lighting Controls	15% More Efficient Design - New Construction	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	5
558		1	Lighting Controls	30% More Efficient Design - New Construction	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	5
<b>600</b>					<b>Refrigeration End Use</b>										
601	I-E-1-b	1	Refrigeration	Vending Miser for Soft Drink Vending Machines	46%	46%	46%	46%	46%	46%	46%	46%	46%	46%	18
602	I-E-2-a	2	Refrigeration	Refrigerated Case Covers	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	5
603	I-E-6-a	1	Refrigeration	Refrigeration Economizer	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	18
604	I-E-3-a	1	Refrigeration	Commercial Reach-In Refrigerators	26%	26%	26%	26%	26%	26%	26%	26%	26%	26%	18
605	I-E-4-a	1	Refrigeration	Commercial Reach-In Freezer	9%	9%	9%	9%	9%	9%	9%	9%	9%	9%	18
606	I-E-5-a	1	Refrigeration	Commercial Ice-makers	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	18
607	I-E-7-a	2	Refrigeration	Evaporator Fan Motor Controls	30%	30%	30%	30%	30%	30%	30%	30%	30%	30%	18
608	I-E-8-a	2	Refrigeration	Permanent Split Capacitor Motor	4%	4%	4%	4%	4%	4%	4%	4%	4%	4%	5
609	I-E-9-a	2	Refrigeration	Zero-Energy Doors	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%	18
610	I-E-10-a	1	Refrigeration	Door Heater Controls	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	18
611	I-E-11-a	2	Refrigeration	Discus and Scroll Compressors	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	5
612	I-E-12-a	1	Refrigeration	Floating Head Pressure Control	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	5
613		1	Refrigeration	Anti-sweat (humidistat) controls (refrigerator)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5
614		1	Refrigeration	Anti-sweat (humidistat) controls (freezer)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5
615	I-E-5-a	2	Refrigeration	High Efficiency Ice Maker	6%	6%	6%	6%	6%	6%	6%	6%	6%	6%	18
<b>700</b>					<b>Compressed Air End Use</b>										
701	I-F-1-b	2	C Air	Compressed Air - Non-Controls	0%	20%	1%	0%	0%	0%	20%	20%	0%	20%	13
702	I-F-2-b	1	C Air	Compressed Air - Controls	0%	15%	1%	0%	0%	0%	15%	15%	0%	15%	13
<b>720</b>					<b>Snow Making End Use</b>										
721	I-G-1-a	2	Snow making	Snow Making	0%	0%	0%	0%	0%	0%	0%	80%	0%	80%	9
<b>740</b>					<b>Office Equipment</b>										
741	I-H-1-a	1	Monitors	EZ Save Monitor Power Management Software	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	18
<b>760</b>					<b>Water/Wastewater Treatment</b>										
761	I-I-1-a	1	Pumping and aeration	Improved equipment and controls	0%	0%	0%	0%	0%	0%	0%	0%	0%	35%	28
<b>780</b>					<b>Transformer End Use</b>										
781	I-D-1-d	2	Transformer	Energy Star Transformers	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	18
<b>800</b>					<b>Dairy Farms</b>										
801	I-A-5-b	1	Dairy Farms	VFDs for Milk Transfer Pumps	33%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25
802		1	Dairy Farms	VFDs for Milk Vacuum Pumps	33%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25

					1	2	3	4	5	6	7	8	9	10	
	TRM Measure Number	Cost Type: 1=Full 2=Inc.	End Use	Measure Name	Dairy	Light Manufac	Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other	Source
100				Space Heating											
101	I-L-1-a	2	Space Heating	High Efficiency Heat Pump	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	24
102		2	Space Heating	Hydronic Heating Pump	72%	72%	72%	72%	72%	72%	72%	72%	72%	72%	24
103		2	Space Heating	Ground Source Heat Pump - Heating	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	9
150	III-D-1-b	Act 250		Water Heating End Use											
151	I-K-1-a	2	Water Heating	Heat Pump Water Heater	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	9
152		2	Water Heating	Booster Water Heater	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%	24
153		1	Water Heating	Point of Use Water Heater	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%	24
154		1	Water Heating	Solar Water Heating System	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	9
155		1	Water Heating	Solar Pool Heating	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	9
200				Envelope											
201	I-M-1-a	2	Space Heating	Integrated Building Design	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
202		2	Space Heating	Double Pane Low Emissivity Windows	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	27
300				Space Cooling - Chillers											
301		2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 300 tons	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	24
302		2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 500 tons	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	24
303		2	Space Cooling - Chillers	Centrifugal Chiller, Optimal Design, 0.4 kW/ton, 500 tons	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	24
320				Space Cooling - Packaged AC											
321	I-B-1-g	2	Space Cooling - Packaged	Electric HVAC	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	24
322		2	Space Cooling - Packaged	DX Packaged system EER = 10.9, 10 tons	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	24
323		2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, <20 Tons	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	24
324		2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, >20 Tons	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	24
325		2	Space Cooling - Packaged	Packaged AC - 3 tons, Tier 2	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	24
326		2	Space Cooling - Packaged	Packaged AC - 7.5 tons, Tier 2	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	24
327		2	Space Cooling - Packaged	Packaged AC - 15 tons, Tier 2	67%	67%	67%	67%	67%	67%	67%	67%	67%	67%	24
328		2	Space Cooling - Packaged	Ground Source Heat Pump - Cooling	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	9
340				Space Cooling - Maintenance											
341		1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 300 ton	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	5
342		1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 500 ton	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	5
343		1	Space Cooling - Maint.	DX Tune Up/ Advanced Diagnostics	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	5
360				HVAC Controls											
361		1	HVAC Controls	Retrocommissioning	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	10
362		1	HVAC Controls	Programmable Thermostats	48%	48%	48%	48%	48%	48%	48%	48%	48%	48%	24
363		1	HVAC Controls	EMS install	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%	24
364		1	HVAC Controls	EMS Optimization	73%	73%	73%	73%	73%	73%	73%	73%	73%	73%	24
380				HVAC End Use											
381	I-B-2-c	2	HVAC	Dual Enthalpy Economizer - from Fixed Damper	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	24
382	I-B-2-c	2	HVAC	Dual Enthalpy Economizer - from Dry Bulb	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	24
383	I-A-3-a	2	HVAC	Comprehensive Track Proper HVAC Sizing	93%	93%	93%	93%	93%	93%	93%	93%	93%	93%	24
384	I-J-1-a	2	HVAC	Demand-Controlled Ventilation	71%	71%	71%	71%	71%	71%	71%	71%	71%	71%	24
385	BREC	2	HVAC	Heat Recovery	72%	72%	72%	72%	72%	72%	72%	72%	72%	72%	24
386	BREC	2	HVAC	Fan Motor, 40hp, 1800rpm, 94.1%	75%	75%	75%	100%	75%	75%	75%	75%	75%	75%	5
387	BREC	2	HVAC	Fan Motor, 15hp, 1800rpm, 92.4%	75%	75%	75%	100%	75%	75%	75%	75%	75%	75%	5
388	BREC	2	HVAC	Fan Motor, 5hp, 1800rpm, 89.5%	75%	75%	75%	100%	75%	75%	75%	75%	75%	75%	5
389	BREC	2	HVAC	Variable Speed Drive Control, 15 HP	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	24
390	BREC	2	HVAC	Variable Speed Drive Control, 5 HP	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	24
391	BREC	2	HVAC	Variable Speed Drive Control, 40 HP	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	24
400				Motors End Use											
401	I-A-1-e	2	Motors	Efficient Motors	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	9
402	I-A-2-a	2	Motors	Variable Frequency Drives (VFD)	72%	72%	72%	72%	72%	72%	72%	72%	72%	72%	24
403	I-A-3-a	2	Motors	VFD for Environmental Remediation Projects	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	9
404	I-A-4-a	2	Motors	Efficient Environmental Remediation Motors	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	9
405	I-A-5-b	2	Motors	Variable Frequency Drives (VFD) for Dairy Farms	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9
500				Lighting End Use											
501	I-C-12-d	2	Lighting	Super T8 Fixture - from 34W T12	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	27, 9
502	I-C-12-d	2	Lighting	Super T8 Fixture - from standard T8	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%	24
503	I-C-14-a	2	Lighting	T5 Fluorescent High-Bay Fixtures	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	24, 27
504	I-C-14-a	2	Lighting	T5 Troffer/Wrap	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	27
505	I-C-14-a	2	Lighting	T5 Industrial Strip	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	27
506	I-C-14-a	2	Lighting	T5 Indirect	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	27
507	I-C-2-e	2	Lighting	CFL Fixture	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	24
508	I-C-3-d	2	Lighting	Exterior HID	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%	9

#	TRM Measure Number	Cost Type: 1=Full 2=Inc.	End Use	Measure Name	1	2	3	4	5	6	7	8	9	10	Source
					Dairy	Light Manufac	Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other	
509	I-C-4-d	2	Lighting	LED Exit Sign	44%	44%	44%	44%	44%	44%	44%	44%	44%	44%	24
510	I-C-5-g	1	Lighting	Lighting Controls	42%	42%	42%	42%	42%	42%	42%	42%	42%	42%	
511	I-C-6-b	2	Lighting	LED Traffic / Pedestrian Signals	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	27
512	I-C-17-a	2	Lighting	Electronic HID Fixture Upgrade	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
513	I-C-15-a	2	Lighting	Halogen Infra-Red Bulb	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
514	I-C-16-a	2	Lighting	Integrated Ballast MH 25W	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
515	I-C-16-a	2	Lighting	Induction Fluorescent 23W	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
516	I-C-8-c	2	Lighting	CFL Screw-in	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	24
517	I-C-9-b	2	Lighting	Dairy Farm Hard-Wired Vapor-Proof CFL Fixture with Electronic Ballast	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	9
518	I-C-10-b	2	Lighting	Dairy Farm Vapor Proof T8 Fixture with Electronic Ballast	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	9
519	I-C-11-a	2	Lighting	Metal Halide Track	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	9
520	I-C-14-a	2	Lighting	Lighting Power Density	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
<b>550 Lighting Controls</b>															
551		1	Lighting Controls	Bi-Level Switching	95%	75%	95%	95%	75%	95%	95%	95%	75%	75%	9
552		1	Lighting Controls	Occupancy Sensors	72%	72%	72%	72%	72%	72%	72%	72%	72%	72%	24
553		1	Lighting Controls	Daylight Dimming	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	24
554		1	Lighting Controls	Daylight Dimming - New Construction	65%	65%	65%	65%	65%	65%	65%	65%	65%	65%	24
555		2	Lighting Controls	5% More Efficient Design	63%	63%	63%	63%	63%	63%	63%	63%	63%	63%	
556		2	Lighting Controls	10% More Efficient Design	63%	63%	63%	63%	63%	63%	63%	63%	63%	63%	
557		1	Lighting Controls	15% More Efficient Design - New Construction	63%	63%	63%	63%	63%	63%	63%	63%	63%	63%	
558		1	Lighting Controls	30% More Efficient Design - New Construction	63%	63%	63%	63%	63%	63%	63%	63%	63%	63%	
<b>600 Refrigeration End Use</b>															
601	I-E-1-b	1	Refrigeration	Vending Miser for Soft Drink Vending Machines	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	5
602	I-E-2-a	2	Refrigeration	Refrigerated Case Covers	88%	88%	88%	88%	88%	88%	88%	88%	88%	88%	24
603	I-E-6-a	1	Refrigeration	Refrigeration Economizer	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	5
604	I-E-3-a	1	Refrigeration	Commercial Reach-In Refrigerators	62%	62%	62%	62%	62%	62%	62%	62%	62%	62%	24
605	I-E-4-a	1	Refrigeration	Commercial Reach-In Freezer	62%	62%	62%	62%	62%	62%	62%	62%	62%	62%	24
606	I-E-5-a	1	Refrigeration	Commercial Ice-makers	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	5
607	I-E-7-a	2	Refrigeration	Evaporator Fan Motor Controls	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	5
608	I-E-8-a	2	Refrigeration	Permanent Split Capacitor Motor	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	24
609	I-E-9-a	2	Refrigeration	Zero-Energy Doors	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	24
610	I-E-10-a	1	Refrigeration	Door Heater Controls	69%	69%	69%	69%	69%	69%	69%	69%	69%	69%	5
611	I-E-11-a	2	Refrigeration	Discus and Scroll Compressors	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	24
612	I-E-12-a	1	Refrigeration	Floating Head Pressure Control	92%	92%	92%	92%	92%	92%	92%	92%	92%	92%	24
613		1	Refrigeration	Anti-sweat (humidistat) controls (refrigerator)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	24
614		1	Refrigeration	Anti-sweat (humidistat) controls (freezer)	85%	85%	85%	85%	85%	85%	85%	85%	85%	85%	24
615	I-E-5-a	2	Refrigeration	High Efficiency Ice Maker	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	5
<b>700 Compressed Air End Use</b>															
701	I-F-1-b	2	C Air	Compressed Air - Non-Controls	0%	60%	75%	0%	0%	0%	75%	75%	0%	60%	24
702	I-F-2-b	1	C Air	Compressed Air - Controls	0%	60%	75%	0%	0%	0%	75%	75%	0%	60%	24
<b>720 Snow Making End Use</b>															
721	I-G-1-a	2	Snow making	Snow Making	0%	0%	0%	0%	0%	0%	0%	58%	0%	58%	27
<b>740 Office Equipment</b>															
741	I-H-1-a	1	Monitors	EZ Save Monitor Power Management Software	55%	55%	55%	55%	55%	55%	55%	55%	55%	55%	
<b>760 Water/Wastewater Treatment</b>															
761	I-I-1-a	1	Pumping and aeration	Improved equipment and controls	0%	0%	0%	0%	0%	0%	0%	0%	0%	75%	
<b>780 Transformer End Use</b>															
781	I-D-1-d	2	Transformer	Energy Star Transformers	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	27
<b>800 Dairy Farms</b>															
801	I-A-5-b	1	Dairy Farms	VFDs for Milk Transfer Pumps	48%	0%	0%	0%	0%	0%	0%	0%	0%	0%	27
802		1	Dairy Farms	VFDs for Milk Vacuum Pumps	48%	0%	0%	0%	0%	0%	0%	0%	0%	0%	27

## Vermont Energy Efficiency Potential Study - Convertible Factor

May 10, 2006 - Draft

#	TRM Measure Number	Cost Type: 1=Full 2=Inc.	End Use	Measure Name	1	2	3	4	5	6	7	8	9	10	Source
					Dairy	Light Manufac	Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other	
100				<b>Space Heating</b>											
101	I-L-1-a	2	Space Heating	High Efficiency Heat Pump	77%	77%	77%	77%	67%	77%	60%	77%	60%	77%	21
102		2	Space Heating	Hydronic Heating Pump	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	5
103		2	Space Heating	Ground Source Heat Pump - Heating	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	21
150	III-D-1-b	Act 250		<b>Water Heating End Use</b>											
151	I-K-1-a	2	Water Heating	Heat Pump Water Heater	0%	0%	0%	29%	0%	30%	30%	0%	30%	15%	21
152		2	Water Heating	Booster Water Heater	0%	0%	0%	75%	0%	75%	75%	75%	75%	75%	21
153		1	Water Heating	Point of Use Water Heater	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	21
154		1	Water Heating	Solar Water Heating System	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	9
155		1	Water Heating	Solar Pool Heating	0%	0%	0%	0%	0%	25%	0%	0%	25%	0%	9
200				<b>Envelope</b>											
201	I-M-1-a	2	Space Heating	Integrated Building Design	39%	39%	39%	39%	39%	39%	39%	39%	39%	39%	21
202		2	Space Heating	Double Pane Low Emissivity Windows	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	21
300				<b>Space Cooling - Chillers</b>											
301		2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 300 tons	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
302		2	Space Cooling - Chillers	Centrifugal Chiller, 0.51 kW/ton, 500 tons	80%	80%	80%	80%	80%	80%	80%	80%	80%	80%	5
303		2	Space Cooling - Chillers	Centrifugal Chiller, Optimal Design, 0.4 kW/ton, 500 tons	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
320				<b>Space Cooling - Packaged AC</b>											
321	I-B-1-g	2	Space Cooling - Packaged	Electric HVAC	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
322		2	Space Cooling - Packaged	DX Packaged system EER = 10.9, 10 tons	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	2
323		2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, <20 Tons	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	2
324		2	Space Cooling - Packaged	DX Packaged System, CEE Tier 2, >20 Tons	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	2
325		2	Space Cooling - Packaged	Packaged AC - 3 tons, Tier 2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
326		2	Space Cooling - Packaged	Packaged AC - 7.5 tons, Tier 2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
327		2	Space Cooling - Packaged	Packaged AC - 15 tons, Tier 2	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
328		2	Space Cooling - Packaged	Ground Source Heat Pump - Cooling	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	21
340				<b>Space Cooling - Maintenance</b>											
341		1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 300 ton	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	5
342		1	Space Cooling - Maint.	Chiller Tune Up/Diagnostics - 500 ton	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	5
343		1	Space Cooling - Maint.	DX Tune Up/ Advanced Diagnostics	75%	75%	75%	75%	75%	75%	75%	75%	75%	75%	5
360				<b>HVAC Controls</b>											
361		1	HVAC Controls	Retrocommissioning	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	21
362		1	HVAC Controls	Programmable Thermostats	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	5
363		1	HVAC Controls	EMS install	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
364		1	HVAC Controls	EMS Optimization	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
380				<b>HVAC End Use</b>											
381	I-B-2-c	2	HVAC	Dual Enthalpy Economizer - from Fixed Damper	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	5
382	I-B-2-c	2	HVAC	Dual Enthalpy Economizer - from Dry Bulb	14%	14%	14%	14%	14%	14%	14%	14%	14%	14%	5
383	I-A-3-a	2	HVAC	Comprehensive Track Proper HVAC Sizing	56%	56%	56%	56%	56%	56%	56%	56%	56%	56%	9
384	I-J-1-a	2	HVAC	Demand-Controlled Ventilation	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
385	BREC	2	HVAC	Heat Recovery	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
386	BREC	2	HVAC	Fan Motor, 40hp, 1800rpm, 94.1%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
387	BREC	2	HVAC	Fan Motor, 15hp, 1800rpm, 92.4%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
388	BREC	2	HVAC	Fan Motor, 5hp, 1800rpm, 89.5%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
389	BREC	2	HVAC	Variable Speed Drive Control, 15 HP	55%	55%	19%	0%	71%	7%	86%	7%	67%	35%	2
390	BREC	2	HVAC	Variable Speed Drive Control, 5 HP	6%	6%	19%	0%	24%	4%	18%	4%	23%	10%	2
391	BREC	2	HVAC	Variable Speed Drive Control, 40 HP	0%	0%	68%	0%	87%	30%	88%	30%	45%	55%	2
400				<b>Motors End Use</b>											
401	I-A-1-e	2	Motors	Efficient Motors	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	21
402	I-A-2-a	2	Motors	Variable Frequency Drives (VFD)	15%	15%	15%	15%	15%	15%	15%	15%	15%	15%	21
403	I-A-3-a	2	Motors	VFD for Environmental Remediation Projects	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	9
404	I-A-4-a	2	Motors	Efficient Environmental Remediation Motors	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	9
405	I-A-5-b	2	Motors	Variable Frequency Drives (VFD) for Dairy Farms	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9
500				<b>Lighting End Use</b>											
501	I-C-12-d	2	Lighting	Super T8 Fixture - from 34W T12	5%	20%	20%	20%	20%	20%	20%	20%	20%	20%	27, 9
502	I-C-12-d	2	Lighting	Super T8 Fixture - from standard T8	5%	75%	75%	75%	75%	75%	75%	75%	75%	75%	27, 9
503	I-C-14-a	2	Lighting	T5 Fluorescent High-Bay Fixtures	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	21
504	I-C-14-a	2	Lighting	T5 Troffer/Wrap	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
505	I-C-14-a	2	Lighting	T5 Industrial Strip	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
506	I-C-14-a	2	Lighting	T5 Indirect	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
507	I-C-2-e	2	Lighting	CFL Fixture	85%	15%	15%	15%	15%	15%	15%	15%	15%	15%	21
508	I-C-3-d	2	Lighting	Exterior HID	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	21
509	I-C-4-d	2	Lighting	LED Exit Sign	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
510	I-C-5-g	1	Lighting	Lighting Controls	59%	59%	59%	59%	73%	73%	73%	73%	71%	71%	9

## Vermont Energy Efficiency Potential Study - Convertible Factor

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#	TRM Measure Number	Cost Type: 1=Full 2=Inc.	End Use	Measure Name	1	2	3	4	5	6	7	8	9	10	Source
					Dairy	Light Manufac	Retail	Food Sales	Office	Lodging	Health Care	Ski Areas	Schools	Other	
511	I-C-6-b	2	Lighting	LED Traffic / Pedestrian Signals	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
512	I-C-17-a	2	Lighting	Electronic HID Fixture Upgrade	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	21
513	I-C-15-a	2	Lighting	Halogen Infra-Red Bulb	5%	75%	75%	75%	75%	75%	75%	75%	75%	75%	21
514	I-C-16-a	2	Lighting	Integrated Ballast MH 25W	5%	15%	15%	15%	15%	15%	15%	15%	15%	15%	21
515	I-C-16-a	2	Lighting	Induction Fluorescent 23W	5%	75%	75%	75%	75%	75%	75%	75%	75%	75%	21
516	I-C-8-c	2	Lighting	CFL Screw-in	5%	85%	75%	85%	85%	85%	75%	85%	85%	83%	21
517	I-C-9-b	2	Lighting	Dairy Farm Hard-Wired Vapor-Proof CFL Fixture with Electronic Ballast	85%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9
518	I-C-10-b	2	Lighting	Dairy Farm Vapor Proof T8 Fixture with Electronic Ballast	95%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9
519	I-C-11-a	2	Lighting	Metal Halide Track	5%	10%	10%	10%	10%	10%	10%	10%	10%	10%	21
520	I-C-14-a	2	Lighting	Lighting Power Density	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9
550				<b>Lighting Controls</b>											
551		1	Lighting Controls	Bi-Level Switching	59%	59%	25%	59%	73%	25%	73%	73%	71%	71%	27
552		1	Lighting Controls	Occupancy Sensors	20%	20%	10%	10%	40%	20%	50%	20%	50%	20%	5
553		1	Lighting Controls	Daylight Dimming	28%	28%	28%	28%	28%	28%	28%	28%	28%	28%	5
554		1	Lighting Controls	Daylight Dimming - New Construction	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%	9
555		2	Lighting Controls	5% More Efficient Design	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	5
556		2	Lighting Controls	10% More Efficient Design	33%	33%	33%	33%	33%	33%	33%	33%	33%	33%	5
557		1	Lighting Controls	15% More Efficient Design - New Construction	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
558		1	Lighting Controls	30% More Efficient Design - New Construction	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	9
600				<b>Refrigeration End Use</b>											
601	I-E-1-b	1	Refrigeration	Vending Miser for Soft Drink Vending Machines	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
602	I-E-2-a	2	Refrigeration	Refrigerated Case Covers	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	5
603	I-E-6-a	1	Refrigeration	Refrigeration Economizer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
604	I-E-3-a	1	Refrigeration	Commercial Reach-In Refrigerators	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	5
605	I-E-4-a	1	Refrigeration	Commercial Reach-In Freezer	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
606	I-E-5-a	1	Refrigeration	Commercial Ice-makers	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
607	I-E-7-a	2	Refrigeration	Evaporator Fan Motor Controls	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
608	I-E-8-a	2	Refrigeration	Permanent Split Capacitor Motor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
609	I-E-9-a	2	Refrigeration	Zero-Energy Doors	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	9
610	I-E-10-a	1	Refrigeration	Door Heater Controls	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	5
611	I-E-11-a	2	Refrigeration	Discus and Scroll Compressors	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
612	I-E-12-a	1	Refrigeration	Floating Head Pressure Control	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
613		1	Refrigeration	Anti-sweat (humidistat) controls (refrigerator)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
614		1	Refrigeration	Anti-sweat (humidistat) controls (freezer)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
615	I-E-5-a	2	Refrigeration	High Efficiency Ice Maker	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	5
700				<b>Compressed Air End Use</b>											
701	I-F-1-b	2	C Air	Compressed Air - Non-Controls	0%	95%	95%	0%	0%	0%	95%	50%	0%	95%	9
702	I-F-2-b	1	C Air	Compressed Air - Controls	0%	95%	95%	0%	0%	0%	95%	50%	0%	95%	9
720				<b>Snow Making End Use</b>											
721	I-G-1-a	2	Snow making	Snow Making	0%	0%	0%	0%	0%	0%	0%	95%	0%	95%	9
740				<b>Office Equipment</b>											
741	I-H-1-a	1	Monitors	EZ Save Monitor Power Management Software	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	21
760				<b>Water/Wastewater Treatment</b>											
761	I-I-1-a	1	Pumping and aeration	Improved equipment and controls	0%	0%	0%	0%	0%	0%	0%	0%	0%	75%	
780				<b>Transformer End Use</b>											
781	I-D-1-d	2	Transformer	Energy Star Transformers	93%	93%	93%	93%	93%	93%	93%	93%	93%	93%	21
800				<b>Dairy Farms</b>											
801	I-A-5-b	1	Dairy Farms	VFDs for Milk Transfer Pumps	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9
802		1	Dairy Farms	VFDs for Milk Vacuum Pumps	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9



## **APPENDIX C**

### **Industrial Sector**

## **APPENDIX C-1**

### **Assumptions for Energy Efficiency Measures**

TABLE C-1: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - ALL MEASURES  
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				Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Percent Savings by End Use for Agriculture			34.00%	41.00%	25.00%			20.00%							40.00%	
	Percent Savings by End Use for General Industry			45.52%	35.12%	29.18%	7.12%	7.12%	10.12%	7.12%	6.80%	6.80%	6.80%	6.80%	19.00%	83.80%	3.80%
NAICS CODE		Annual kWh Sales in 2015	Percent of Total														
	Agriculture	140,065,859	7.56%	8,095,807	6,316,970	1,750,823	0	0	7,003,293	0	0	0	0	0	0	3,921,844	0
	Mining	12,914,634	0.70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction	38,981,455	2.11%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-33	<b>Manufacturing</b>	1,659,830,119	89.63%	63,899,205	37,547,129	25,723,260	13,500,815	21,139,506	11,214,648	2,554,740	1,896,964	2,446,687	6,286,050	679,177	34,279,216	129,714,926	4,729,163
311	Food Manufacturing	219,248,861	11.84%	11,646,932	4,109,507	5,117,795	677,844	2,978,368	5,548,641	744,517	3,500	0	416,470	0	2,499,437	16,535,749	333,258
3115	Dairy	118,178,131	6.38%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
321	Wood Products	109,976,839	5.94%	2,002,590	3,862,717	641,781	2,585,105	2,036,749	0	0	448,706	0	0	0	1,253,736	6,451,241	250,747
322	Paper	276,323,958	14.92%	36,479,377	16,673,242	5,643,806	1,263,741	3,629,650	468,155	1,810,223	294,823	0	98,274	0	1,575,047	9,262,379	210,006
323	Printing	42,960,719	2.32%	811,616	716,732	520,206	546,226	582,948	0	0	175,280	0	0	0	0	9,576,288	284,873
326	Plastic and Rubber	83,228,627	4.49%	3,263,420	1,224,911	791,451	1,159,265	966,054	690,593	0	4,231	0	892,638	0	1,469,008	5,335,728	224,672
327	Mineral Products	125,490,549	6.78%	2,562,683	1,600,609	2,563,094	1,871,258	2,263,551	0	0	33,485	1,109,336	256,001	559,682	1,245,541	4,708,705	284,695
327991	Cut Stone	68,226,354	3.58%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332	Fabricated metal	118,993,440	6.43%	1,170,618	1,806,367	1,500,618	1,355,436	2,014,838	205,325	0	231,023	458,598	537,904	13,792	2,055,341	10,764,850	565,219
333	Machinery	63,234,461	3.41%	613,016	709,454	922,528	803,321	762,396	195,956	0	0	211,617	137,929	45,347	2,206,754	8,110,788	216,262
334	Computers	358,117,803	19.34%	2,815,961	3,476,221	5,224,581	1,101,536	2,835,007	3,625,227	0	403,258	0	3,165,761	0	17,879,750	39,429,554	1,496,932
335	Electric Products	36,839,147	1.99%	362,411	559,233	464,576	419,629	623,773	63,566	0	71,522	141,977	166,530	4,270	636,313	3,332,687	174,986
335929	Wire manufacturing	13,530,768	0.73%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
336	Transportation	58,161,687	3.14%	1,169,210	1,262,936	1,049,168	557,987	722,639	241,547	0	33,515	132,864	154,409	44,288	1,700,111	6,998,491	204,013
337	Furniture	53,676,682	2.90%	528,054	814,833	676,913	611,423	908,872	92,620	0	104,212	206,869	242,643	6,222	927,143	4,855,910	254,964
339	Misc. Manufacturing	48,112,660	2.60%	473,317	730,369	606,745	948,044	814,660	83,019	0	93,410	185,425	217,491	5,577	831,037	4,352,556	228,535
	Total Industrial kWh Sales in 2015 from VDPS Load Forecast (kWh Sales at the level of the Customer Meter)	1,851,792,067		71,995,012	43,864,100	27,474,084	13,500,815	21,139,506	18,217,941	2,554,740	1,896,964	2,446,687	6,286,050	679,177	34,279,216	133,636,770	4,729,163
	Technical Potential Annual kWh Savings by 2015	382,700,223															
	% of 2015 kWh Sales	20.67%															

				Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Percent Savings by End Use for Agriculture			34.00%	41.00%	25.00%	0.00%	0.00%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	40.00%	0.00%
	Percent Savings by End Use for General Industry			43.42%	33.02%	29.18%	7.12%	7.12%	8.02%	7.12%	4.70%	4.70%	4.70%	4.70%	19.00%	83.80%	3.80%
Differences				Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Percent Savings by End Use for Agriculture			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Percent Savings by End Use for General Industry			-2.10%	-2.10%	0.00%	0.00%	0.00%	-2.10%	0.00%	-2.10%	-2.10%	-2.10%	-2.10%	0.00%	0.00%	0.00%
				2.10%	2.10%	0.00%	0.00%	0.00%	2.10%	0.00%	2.10%	2.10%	2.10%	2.10%	0.00%	0.00%	0.00%

Table C-2: Summary of Industrial Sector Energy Efficiency Potential in Vermont		
	Estimated Cumulative Annual Savings by 2015 (kWh)	Savings in 2015 as a Percent of Total 2015 Industrial Sector kWh Sales
Technical Potential	382,700	20.7%
Maximum Achievable Potential	306,160	16.5%
Maximum Achievable Cost Effective Potential	306,160	16.5%

Table C-3: Industrial Sector Technical Savings Potential (kWh) by Type of Energy Efficiency Measure  
By 2015

Measure #	Industrial Energy Efficiency Measure	Technical Potential Savings by 2015 (annual kWh)	Percent of Total
1	Efficient industrial lamps and fixtures	127,754,709	33.4%
2	Motor system optimization (including ASD)	74,404,424	19.4%
3	Electric supply system improvements	47,830,845	12.5%
4	Pump system efficiency improvements	31,115,972	8.1%
5	Air compressor system management	20,484,776	5.4%
6	Advanced motor designs	16,704,811	4.4%
7	Other industrial energy efficiency measures	13,356,056	3.5%
8	Transformers (NEMA Tier II)	12,754,892	3.3%
9	Fan system improvements	12,731,080	3.3%
10	Industrial motor management	9,683,948	2.5%
11	Sensor and Controls	9,378,023	2.5%
12	Advanced lubricants	5,791,001	1.5%
13	Advanced Air compressor Controls	709,686	0.2%
	Total Industrial Sector Savings Potential	382,700,223	100.0%

Table C-4: Industrial Sector Maximum Achievable Cost Effective Savings Potential (kWh) by Type of Energy Efficiency Measure by 2015

Measure #	Industrial Energy Efficiency Measure	Technical Potential Savings by 2015 (annual kWh)	Percent of Total
1	Efficient industrial lamps and fixtures	102,203,767	33.4%
2	Motor system optimization (including ASD)	59,523,539	19.4%
3	Electric supply system improvements	38,264,676	12.5%
4	Pump system efficiency improvements	24,892,777	8.1%
5	Air compressor system management	16,387,821	5.4%
6	Advanced motor designs	13,363,848	4.4%
7	Other industrial energy efficiency measures	10,684,845	3.5%
8	Transformers (NEMA Tier II)	10,203,914	3.3%
9	Fan system improvements	10,184,864	3.3%
10	Industrial motor management	7,747,159	2.5%
11	Sensor and Controls	7,502,419	2.5%
12	Advanced lubricants	4,632,801	1.5%
13	Advanced Air compressor Controls	567,749	0.2%
	Total Industrial Sector Savings Potential	306,160,178	100.0%

Table C-5: ESTIMATES OF INDUSTRIAL SECTOR KWH SALES BY END USE IN VERMONT FOR THE YEAR 2012

		Annual kWh Sales in 2015	Percent of Total	Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Agriculture	140,065,859	7.56%	23,811,196	15,407,245	7,003,293	0	0	35,016,465	9,804,610	0	0	33,615,806	0	0	9,804,610	5,602,634
	Mining	12,914,634	0.70%														0
	Construction	38,981,455	2.11%														0
31-33	<b>Manufacturing</b>	1,659,830,119	89.63%	140,366,859	106,901,829	88,159,779	189,538,325	296,778,120	110,783,835	35,866,066	27,896,526	35,980,685	92,441,918	9,987,901	180,416,927	154,791,081	124,451,651
311	Food Manufacturing	219,248,861	11.84%	25,584,720	11,700,329	17,539,909	9,516,268	41,813,390	54,812,215	10,452,294	51,467	0	6,124,557	0	13,154,932	19,732,397	8,769,954
3115	Dairy	118,178,131	6.38%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
321	Wood Products	109,976,839	5.94%	4,399,074	10,997,684	2,199,537	36,292,357	28,593,978	0	0	6,598,610	0	0	0	6,598,610	7,698,379	6,598,610
322	Paper	276,323,958	14.92%	80,133,948	47,471,008	19,342,677	17,741,690	50,956,767	4,624,669	25,413,772	4,335,627	0	1,445,209	0	8,289,719	11,052,958	5,526,479
323	Printing	42,960,719	2.32%	1,782,870	2,040,634	1,782,870	7,668,488	8,184,017	0	0	2,577,643	0	0	0	0	11,427,551	7,496,645
326	Plastic and Rubber	83,228,627	4.49%	7,168,728	3,487,489	2,712,492	16,274,950	13,562,458	6,822,019	0	62,213	0	13,127,023	0	7,731,621	6,367,217	5,912,416
327	Mineral Products	125,490,549	6.78%	5,629,424	4,557,153	8,784,338	26,270,645	31,778,052	0	0	492,430	16,313,771	3,764,716	8,230,618	6,555,476	5,618,980	7,491,973
327991	Cut Stone	66,226,354	3.58%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332	Fabricated metal	118,993,440	6.43%	2,571,488	5,142,976	5,142,976	19,029,011	28,286,368	2,028,297	0	3,397,398	6,744,088	7,910,359	202,830	10,817,585	12,845,883	14,874,180
333	Machinery	63,234,461	3.41%	1,346,608	2,019,912	3,161,723	11,277,841	10,703,305	1,935,749	0	0	3,112,017	2,028,368	666,861	11,614,493	9,678,744	5,691,101
334	Computers	358,117,803	19.34%	6,185,798	9,897,277	17,905,890	15,464,495	39,800,742	35,811,780	0	5,930,265	0	46,555,314	0	94,103,948	47,051,974	39,392,958
335	Electric Products	36,839,147	1.99%	796,106	1,592,213	1,592,213	5,891,186	8,757,169	627,940	0	1,051,800	2,087,901	2,448,966	62,794	3,349,013	3,976,953	4,604,893
335929	Wire manufacturing	13,530,768	0.73%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
336	Transportation	58,161,687	3.14%	2,568,394	3,595,751	3,595,751	7,833,600	10,145,155	2,386,121	0	492,871	1,953,881	2,270,726	651,294	8,947,952	8,351,422	5,368,771
337	Furniture	53,676,682	2.90%	1,159,971	2,319,942	2,319,942	8,583,786	12,759,681	914,943	0	1,532,530	3,042,187	3,568,279	91,494	4,879,698	5,794,642	6,709,585
339	Misc. Manufacturing	48,112,660	2.60%	1,039,731	2,079,461	2,079,461	7,694,007	11,437,037	820,102	0	1,373,671	2,726,840	3,198,398	82,010	4,373,878	5,193,980	6,014,083
	Total Industrial kWh Sales	1,851,792,067		164,178,055	122,309,073	95,163,072	189,538,325	296,778,120	145,800,300	45,670,676	27,896,526	35,980,685	126,057,724	9,987,901	180,416,927	164,595,691	130,054,285

Table C-6: Calculations Provided by Neal Elliott of ACEEE to determine industrial kWh sales by NAICS Code for Vermont

100%

1.00%	0.00%	99.50%
1.00%		0.00%
1.00%	0.00%	102.00%
1.00%	0.00%	100.04%
1.00%	0.00%	100.05%
1.00%	0.00%	100.00%
1.00%	0.00%	99.67%
1.00%		0.00%
1.00%	0.00%	100.00%
1.00%	0.00%	100.11%
1.00%	0.00%	100.20%
1.00%	0.00%	100.00%
1.00%		0.00%
1.00%	0.00%	100.00%
1.00%	0.00%	100.00%
1.00%	0.00%	100.00%

131.1981982	8%	119,261
205.368072	12%	186,683
103.0141338	6%	93,642
258.829708	15%	235,280
117.54566	7%	106,851
111.459888	6%	101,319
335.4451305	19%	304,925
54.4794328	3%	49,523
	24%	379,254



Table C-7: Industrial Energy Efficiency Measure Data Provided by Neal Elliott of ACEEE

	Measures	Measure life (years)	Technical Savings Potential as a percent of appropriate end use	Levelized Cost (\$/kWh)	Notes														
	<b>Ag/Dairy</b>																		
	Pumps	10	34%																
	Fans	10	41%																
	Compressed air/vacuum pumps	10	25%																
	Refrigeration	10	20%																
	Lighting	5	40%																
	<b>General Industry</b>																		
						Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
1	Sensor and Controls	10	3.0%	(0.5000)	Assumes 30% applicability - eligibility varies by but assumes assumes applies to:Pumps, Fan, Refrigeration, Drying and Curing, Heat Treating, Heating, Melting and Casting	0.90%	0.90%	0.00%	0.00%	0.00%	0.90%	0.00%	0.90%	0.90%	0.90%	0.90%	0.00%	0.00%	0.00%
2	Advanced lubricants	0.5	2.6%	(0.0636)	Applies to 23% of motor loads	0.60%	0.60%	0.60%	0.60%	0.60%	0.60%	0.60%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3	Electric supply system improvements	5	3.0%	(0.0060)	Applies to all electrical service	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
4	Pump system efficiency improvements	10	16.4%	(0.0007)	Applies to all Pump energy	16.40%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	Advanced Air compressor Controls	15	3.5%	0.0002	Applies to multi-compressor systems -- ~23% of compressed air	0.00%	0.00%	0.81%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
6	Industrial motor management	20	1.0%	0.0013	Applies to all motors	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
7	Air compressor system management	1.5	25.0%	0.0015	Applies to larger systems -- ~85% of CA loads			21.25%											
8	Fan system improvements	10	6.0%	0.0023	Applies to all fan energy		6.00%												
9	Advanced motor designs	10	2.3%	0.0025	Applies to general purpose, integral HP induction motors represent about 75% of motor installed HP	1.73%	1.73%	1.73%	1.73%	1.73%	1.73%	1.73%							
10	Motor system optimization (including ASD)	10	19.0%	0.0025	Applies to all pumps, fans and 80% of HVAC	19.00%	19.00%										15.20%		
11	Transformers (NEMA Tier II)	30	1.6%	0.0050	Applies to all electrical service with onsite transformers -- ~20%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%
12	Efficient industrial lamps and fixtures	20	50.0%	0.0105	There is signification interaction between these measures so cannot be treated indepently -- suggest looking at a these as a combined measure with 50% acheivable potential on lighting													80.00%	
13	Efficient lighting design	20	80.0%	0.0114															
	total			(0.555)		43.42%	33.02%	29.18%	7.12%	7.12%	8.02%	7.12%	4.70%	4.70%	4.70%	4.70%	19.00%	83.80%	3.80%

TABLE C-8: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - SENSORS AND CONTROLS  
4/14/2006 15:42

				Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Percent Savings by End Use for Agriculture			0.00%	0.00%	0.00%	0.00%	0.00%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Percent Savings by End Use for General Industry			0.90%	0.90%	0.00%	0.00%	0.00%	0.90%	0.00%	0.90%	0.90%	0.90%	0.90%	0.00%	0.00%	0.00%
NAICS CODE		Annual Industrial kWh Sales in 2015	Percent of Total														
	Agriculture	140,065,859	7.56%	0	0	0	0	0	7,003,293	0	0	0	0	0	0	0	0
	Mining	12,914,634	0.70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction	38,981,455	2.11%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-33	<b>Manufacturing</b>	1,659,830,119	89.63%	1,263,302	962,116	0	0	0	997,055	0	251,069	323,826	831,977	89,891	0	0	0
311	Food Manufacturing	219,248,861	11.84%	230,262	105,303	0	0	0	493,310	0	463	0	55,121	0	0	0	0
3115	Dairy	118,178,131	6.38%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
321	Wood Products	109,976,839	5.94%	39,592	98,979	0	0	0	0	0	59,387	0	0	0	0	0	0
322	Paper	276,323,958	14.92%	721,206	427,239	0	0	0	41,622	0	39,021	0	13,007	0	0	0	0
323	Printing	42,960,719	2.32%	16,046	18,366	0	0	0	0	0	23,199	0	0	0	0	0	0
326	Plastic and Rubber	83,228,627	4.49%	64,519	31,387	0	0	0	61,398	0	560	0	118,143	0	0	0	0
327	Mineral Products	125,490,549	6.78%	50,665	41,014	0	0	0	0	0	4,432	146,824	33,882	74,076	0	0	0
327991	Cut Stone	66,226,354	3.58%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332	Fabricated metal	118,993,440	6.43%	23,143	46,287	0	0	0	18,255	0	30,577	60,697	71,193	1,825	0	0	0
333	Machinery	63,234,461	3.41%	12,119	18,179	0	0	0	17,422	0	0	28,008	18,255	6,002	0	0	0
334	Computers	358,117,803	19.34%	55,672	89,075	0	0	0	322,306	0	53,372	0	418,998	0	0	0	0
335	Electric Products	36,839,147	1.99%	7,165	14,330	0	0	0	5,651	0	9,466	18,791	22,041	565	0	0	0
335929	Wire manufacturing	13,530,768	0.73%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
336	Transportation	58,161,687	3.14%	23,116	32,362	0	0	0	21,475	0	4,436	17,585	20,437	5,862	0	0	0
337	Furniture	53,676,682	2.90%	10,440	20,879	0	0	0	8,234	0	13,793	27,380	32,115	823	0	0	0
339	Misc. Manufacturing	48,112,660	2.60%	9,358	18,715	0	0	0	7,381	0	12,363	24,542	28,786	738	0	0	0
Total Industrial kWh Sales		1,851,792,067		1,263,302	962,116	0	0	0	8,000,347	0	251,069	323,826	831,977	89,891	0	0	0

Technical Potential Annual kWh Savings by 2015	11,722,529
% of 2015 kWh Sales	0.63%

TABLE C-9: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - ADVANCED LUBRICANTS  
4/14/2006 15:42

				Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Percent Savings by End Use for Agriculture			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Percent Savings by End Use for General Industry			0.60%	0.60%	0.60%	0.60%	0.60%	0.60%	0.60%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NAICS CODE		Annual Industrial kWh Sales in 2015	Percent of Total														
	Agriculture	140,065,859	7.56%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mining	12,914,634	0.70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction	38,981,455	2.11%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-33	<b>Manufacturing</b>	1,659,830,119	89.63%	839,394	639,273	527,195	1,133,439	1,774,733	662,487	214,479	0	0	0	0	0	0	0
311	Food Manufacturing	219,248,861	11.84%	152,997	69,968	104,889	56,907	250,044	327,777	62,505	0	0	0	0	0	0	0
3115	Dairy	118,178,131	6.38%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
321	Wood Products	109,976,839	5.94%	26,306	65,766	13,153	217,028	170,992	0	0	0	0	0	0	0	0	0
322	Paper	276,323,958	14.92%	479,201	283,877	115,669	106,095	304,721	27,656	151,974	0	0	0	0	0	0	0
323	Printing	42,960,719	2.32%	10,662	12,203	10,662	45,858	48,940	0	0	0	0	0	0	0	0	0
326	Plastic and Rubber	83,228,627	4.49%	42,869	20,855	16,221	97,324	81,104	40,796	0	0	0	0	0	0	0	0
327	Mineral Products	125,490,549	6.78%	33,664	27,252	52,530	157,098	190,033	0	0	0	0	0	0	0	0	0
327991	Cut Stone	66,226,354	3.58%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332	Fabricated metal	118,993,440	6.43%	15,377	30,755	30,755	113,793	169,152	12,129	0	0	0	0	0	0	0	0
333	Machinery	63,234,461	3.41%	8,053	12,079	18,907	67,441	64,006	11,576	0	0	0	0	0	0	0	0
334	Computers	358,117,803	19.34%	36,991	59,186	107,077	92,478	238,008	214,154	0	0	0	0	0	0	0	0
335	Electric Products	36,839,147	1.99%	4,761	9,521	9,521	35,229	52,368	3,755	0	0	0	0	0	0	0	0
335929	Wire manufacturing	13,530,768	0.73%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
336	Transportation	58,161,687	3.14%	15,359	21,503	21,503	46,845	60,668	14,269	0	0	0	0	0	0	0	0
337	Furniture	53,676,682	2.90%	6,937	13,873	13,873	51,331	76,303	5,471	0	0	0	0	0	0	0	0
339	Misc. Manufacturing	48,112,660	2.60%	6,218	12,435	12,435	46,010	68,393	4,904	0	0	0	0	0	0	0	0
	Total Industrial kWh Sales	1,851,792,067		839,394	639,273	527,195	1,133,439	1,774,733	662,487	214,479	0	0	0	0	0	0	0

Technical Potential Annual kWh Savings by 2015	5,791,001
% of 2015 kWh Sales	0.31%

TABLE C-10: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - SUPPLY SYSTEM IMPROVEMENTS  
4/14/2006 15:43

				Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Percent Savings by End Use for Agriculture			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Percent Savings by End Use for General Industry			3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%	3.00%
NAICS CODE		Annual Industrial kWh Sales in 2015	Percent of Total														
	Agriculture	140,065,859	7.56%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mining	12,914,634	0.70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction	38,981,455	2.11%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-33	<b>Manufacturing</b>	1,659,830,119	89.63%	4,211,006	3,207,055	2,644,793	5,686,150	8,903,344	3,323,515	1,075,982	836,896	1,079,421	2,773,258	299,637	5,412,508	4,643,732	3,733,550
311	Food Manufacturing	219,248,861	11.84%	767,542	351,010	526,197	285,488	1,254,402	1,644,366	313,569	1,544	0	183,737	0	394,648	591,972	263,099
3115	Dairy	118,178,131	6.38%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
321	Wood Products	109,976,839	5.94%	131,972	329,931	65,986	1,088,771	857,819	0	0	197,958	0	0	0	197,958	230,951	197,958
322	Paper	276,323,958	14.92%	2,404,018	1,424,130	580,280	532,251	1,528,703	138,740	762,413	130,069	0	43,356	0	248,692	331,589	165,794
323	Printing	42,960,719	2.32%	53,486	61,219	53,486	230,055	245,521	0	0	77,329	0	0	0	0	342,827	224,899
326	Plastic and Rubber	83,228,627	4.49%	215,062	104,625	81,375	488,249	406,874	204,661	0	1,866	0	393,811	0	231,949	191,017	177,372
327	Mineral Products	125,490,549	6.78%	168,883	136,715	263,530	788,119	953,342	0	0	14,773	489,413	112,941	246,919	196,664	168,569	224,759
327991	Cut Stone	66,226,354	3.58%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332	Fabricated metal	118,993,440	6.43%	77,145	154,289	154,289	570,870	848,591	60,849	0	101,922	202,323	237,311	6,085	324,528	385,376	446,225
333	Machinery	63,234,461	3.41%	40,398	60,597	94,852	338,335	321,099	58,072	0	93,361	60,851	20,006	348,435	290,362	170,733	
334	Computers	358,117,803	19.34%	185,574	296,918	537,177	463,935	1,194,022	1,074,353	0	177,908	0	1,396,659	0	2,823,118	1,411,559	1,181,789
335	Electric Products	36,839,147	1.99%	23,883	47,766	47,766	176,736	262,715	18,838	0	31,554	62,637	73,469	1,884	100,470	119,309	138,147
335929	Wire manufacturing	13,530,768	0.73%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
336	Transportation	58,161,687	3.14%	77,052	107,873	107,873	235,008	304,355	71,584	0	14,786	58,616	68,122	19,539	268,439	250,543	161,063
337	Furniture	53,676,682	2.90%	34,799	69,598	69,598	257,514	382,790	27,448	0	45,976	91,266	107,048	2,745	146,391	173,839	201,288
339	Misc. Manufacturing	48,112,660	2.60%	31,192	62,384	62,384	230,820	343,111	24,603	0	41,210	81,805	95,952	2,460	131,216	155,819	180,422
Total Industrial kWh Sales		1,851,792,067		4,211,006	3,207,055	2,644,793	5,686,150	8,903,344	3,323,515	1,075,982	836,896	1,079,421	2,773,258	299,637	5,412,508	4,643,732	3,733,550

Technical Potential Annual kWh Savings by 2015	47,830,845
% of 2015 kWh Sales	2.58%

TABLE C-11: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - PUMP SYSTEMS

[illegible]

Technical Potential Annual kWh Savings by 2015	31,115,972
% of 2015 kWh Sales	1.68%

TABLE C-12: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - ADVANCED COMPRESSOR CONTROLS

4/14/2006 15:44

				Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Percent Savings by End Use for Agriculture			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Percent Savings by End Use for General Industry			0.00%	0.00%	0.81%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NAICS CODE		Annual Industrial kWh Sales in 2015	Percent of Total														
	Agriculture	140,065,859	7.56%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mining	12,914,634	0.70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction	38,981,455	2.11%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-33	<b>Manufacturing</b>	1,659,830,119	89.63%	0	0	709,686	0	0	0	0	0	0	0	0	0	0	0
311	Food Manufacturing	219,248,861	11.84%	0	0	141,196	0	0	0	0	0	0	0	0	0	0	0
3115	Dairy	118,178,131	6.38%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
321	Wood Products	109,976,839	5.94%	0	0	17,706	0	0	0	0	0	0	0	0	0	0	0
322	Paper	276,323,958	14.92%	0	0	155,709	0	0	0	0	0	0	0	0	0	0	0
323	Printing	42,960,719	2.32%	0	0	14,352	0	0	0	0	0	0	0	0	0	0	0
326	Plastic and Rubber	83,228,627	4.49%	0	0	21,836	0	0	0	0	0	0	0	0	0	0	0
327	Mineral Products	125,490,549	6.78%	0	0	70,714	0	0	0	0	0	0	0	0	0	0	0
327991	Cut Stone	66,226,354	3.58%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332	Fabricated metal	118,993,440	6.43%	0	0	41,401	0	0	0	0	0	0	0	0	0	0	0
333	Machinery	63,234,461	3.41%	0	0	25,452	0	0	0	0	0	0	0	0	0	0	0
334	Computers	358,117,803	19.34%	0	0	144,142	0	0	0	0	0	0	0	0	0	0	0
335	Electric Products	36,839,147	1.99%	0	0	12,817	0	0	0	0	0	0	0	0	0	0	0
335929	Wire manufacturing	13,530,768	0.73%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
336	Transportation	58,161,687	3.14%	0	0	28,946	0	0	0	0	0	0	0	0	0	0	0
337	Furniture	53,676,682	2.90%	0	0	18,676	0	0	0	0	0	0	0	0	0	0	0
339	Misc. Manufacturing	48,112,660	2.60%	0	0	16,740	0	0	0	0	0	0	0	0	0	0	0
Total Industrial kWh Sales		1,851,792,067		0	0	709,686	0	0	0	0	0	0	0	0	0	0	0

Technical Potential Annual kWh Savings by 2015	709,686
% of 2015 kWh Sales	0.04%

TABLE C-13: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - INDUSTRIAL MOTOR MANAGEMENT

4/14/2006 13:44				Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Percent Savings by End Use for Agriculture			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Percent Savings by End Use for General Industry			1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NAICS CODE		Annual Industrial kWh Sales in 2015	Percent of Total														
	Agriculture	140,065,859	7.56%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mining	12,914,634	0.70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction	38,981,455	2.11%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-33	Manufacturing	1,659,830,119	89.63%	1,403,669	1,069,018	881,598	1,895,383	2,967,781	1,107,838	358,661	0	0	0	0	0	0	0
311	Food Manufacturing	219,248,861	11.94%	255,847	117,003	175,399	95,163	418,134	548,122	104,523	0	0	0	0	0	0	0
3115	Dairy	118,178,131	6.38%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
321	Wood Products	109,976,839	5.94%	43,991	109,977	21,995	362,924	285,940	0	0	0	0	0	0	0	0	0
322	Paper	276,323,958	14.92%	801,339	474,710	193,427	177,417	509,568	46,247	254,138	0	0	0	0	0	0	0
323	Printing	42,960,719	2.32%	17,829	20,406	17,829	76,685	81,840	0	0	0	0	0	0	0	0	0
326	Plastic and Rubber	83,228,627	4.49%	71,687	34,875	27,125	162,750	135,625	68,220	0	0	0	0	0	0	0	0
327	Mineral Products	125,490,549	6.78%	56,294	45,572	87,843	262,706	317,781	0	0	0	0	0	0	0	0	0
327991	Cut Stone	66,226,354	3.58%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332	Fabricated metal	118,993,440	6.43%	25,715	51,430	51,430	190,290	282,864	20,283	0	0	0	0	0	0	0	0
333	Machinery	63,234,461	3.41%	13,466	20,199	31,617	112,778	107,033	19,357	0	0	0	0	0	0	0	0
334	Computers	358,117,803	19.34%	61,858	98,973	179,059	154,645	398,007	358,118	0	0	0	0	0	0	0	0
335	Electric Products	36,839,147	1.99%	7,961	15,922	15,922	58,912	87,572	6,279	0	0	0	0	0	0	0	0
335929	Wire manufacturing	13,530,768	0.73%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
336	Transportation	58,161,687	3.14%	25,684	35,958	35,958	78,336	101,452	23,861	0	0	0	0	0	0	0	0
337	Furniture	53,676,682	2.90%	11,600	23,199	23,199	85,838	127,597	9,149	0	0	0	0	0	0	0	0
339	Misc. Manufacturing	48,112,660	2.60%	10,397	20,795	20,795	76,940	114,370	8,201	0	0	0	0	0	0	0	0
Total Industrial kWh Sales		1,851,792,067		1,403,669	1,069,018	881,598	1,895,383	2,967,781	1,107,838	358,661	0	0	0	0	0	0	0
Technical Potential Annual kWh Savings by 2015		9,683,948															
% of 2015 kWh Sales		0.52%															

TABLE C-14: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - AIR COMPRESSOR SYSTEM MANAGEMENT

[illegible]

Technical Potential Annual kWh Savings by 2015	20,484,776
% of 2015 kWh Sales	1.11%



TABLE C-15: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - FAN SYSTEM IMPROVEMENTS

[illegible]

Technical Potential Annual kWh Savings by 2015	12,731,080
% of 2015 kWh Sales	0.69%

TABLE C-17: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - MOTOR SYSTEM OPTIMIZATION

4/14/2006 13:36				Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Percent Savings by End Use for Agriculture			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Percent Savings by End Use for General Industry			19.00%	19.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	15.20%	0.00%	0.00%
NAICS CODE		Annual Industrial kWh Sales in 2015	Percent of Total														
	Agriculture	140,065,859	7.56%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mining	12,914,634	0.70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction	38,981,455	2.11%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-33	<b>Manufacturing</b>	1,659,830,119	89.63%	26,669,703	20,311,348	0	0	0	0	0	0	0	0	0	27,423,373	0	0
311	Food Manufacturing	219,248,861	11.84%	4,861,097	2,223,063	0	0	0	0	0	0	0	0	0	1,999,550	0	0
3115	Dairy	118,178,131	6.38%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
321	Wood Products	109,976,839	5.94%	835,824	2,089,560	0	0	0	0	0	0	0	0	0	1,002,989	0	0
322	Paper	276,323,958	14.92%	15,225,450	9,019,491	0	0	0	0	0	0	0	0	0	1,260,037	0	0
323	Printing	42,960,719	2.32%	338,745	387,720	0	0	0	0	0	0	0	0	0	0	0	0
326	Plastic and Rubber	83,228,627	4.49%	1,362,058	662,623	0	0	0	0	0	0	0	0	0	1,175,206	0	0
327	Mineral Products	125,490,549	6.78%	1,069,591	865,859	0	0	0	0	0	0	0	0	0	996,432	0	0
327991	Cut Stone	66,226,354	3.58%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332	Fabricated metal	118,993,440	6.43%	488,583	977,165	0	0	0	0	0	0	0	0	0	1,644,273	0	0
333	Machinery	63,234,461	3.41%	255,855	383,783	0	0	0	0	0	0	0	0	0	1,765,403	0	0
334	Computers	358,117,803	19.34%	1,175,302	1,880,483	0	0	0	0	0	0	0	0	0	14,303,800	0	0
335	Electric Products	36,839,147	1.99%	151,260	302,520	0	0	0	0	0	0	0	0	0	509,050	0	0
335929	Wire manufacturing	13,530,768	0.73%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
336	Transportation	58,161,687	3.14%	487,995	683,193	0	0	0	0	0	0	0	0	0	1,360,089	0	0
337	Furniture	53,676,682	2.90%	220,394	440,789	0	0	0	0	0	0	0	0	0	741,714	0	0
339	Misc. Manufacturing	48,112,660	2.60%	197,549	395,098	0	0	0	0	0	0	0	0	0	664,829	0	0
	Total Industrial kWh Sales	1,851,792,067		26,669,703	20,311,348	0	0	0	0	0	0	0	0	0	27,423,373	0	0

Technical Potential Annual kWh Savings by 2015	74,404,424
% of 2015 kWh Sales	4.02%

TABLE C-18: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - NEMA TIER II MOTORS  
4/14/2006 15:48

				Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Percent Savings by End Use for Agriculture			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Percent Savings by End Use for General Industry			0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%	0.80%
NAICS CODE		Annual Industrial kWh Sales in 2015	Percent of Total														
	Agriculture	140,065,859	7.56%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Mining	12,914,634	0.70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction	38,981,455	2.11%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-33	<b>Manufacturing</b>	1,659,830,119	89.63%	1,122,935	855,215	705,278	1,516,307	2,374,225	886,271	286,929	223,172	287,845	739,535	79,903	1,443,335	1,238,329	995,613
311	Food Manufacturing	219,248,861	11.84%	204,678	93,603	140,319	76,130	334,507	438,498	83,618	412	0	48,996	0	105,238	157,859	70,160
3115	Dairy	118,178,131	6.38%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
321	Wood Products	109,976,839	5.94%	35,193	87,981	17,596	290,339	228,752	0	0	52,789	0	0	0	52,789	61,587	52,789
322	Paper	276,323,958	14.92%	641,072	379,768	154,741	141,934	407,654	36,997	203,310	34,685	0	11,562	0	66,318	88,424	44,212
323	Printing	42,960,719	2.32%	14,263	16,325	14,263	61,348	65,472	0	0	20,621	0	0	0	0	91,420	59,973
326	Plastic and Rubber	83,228,627	4.49%	57,350	27,900	21,700	130,200	108,500	54,576	0	498	0	105,016	0	61,853	50,938	47,299
327	Mineral Products	125,490,549	6.78%	45,035	36,457	70,275	210,165	254,224	0	0	3,939	130,510	30,118	65,845	52,444	44,952	59,936
327991	Cut Stone	66,226,354	3.58%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332	Fabricated metal	118,993,440	6.43%	20,572	41,144	41,144	152,232	226,291	16,226	0	27,179	53,953	63,283	1,623	86,541	102,767	118,993
333	Machinery	63,234,461	3.41%	10,773	16,159	25,294	90,223	85,626	15,486	0	0	24,896	16,227	5,335	92,916	77,430	45,529
334	Computers	358,117,803	19.34%	49,486	79,178	143,247	123,716	318,406	286,494	0	47,442	0	372,443	0	752,832	376,416	315,144
335	Electric Products	36,839,147	1.99%	6,369	12,738	12,738	47,129	70,057	5,024	0	8,414	16,703	19,592	502	26,792	31,816	36,839
335929	Wire manufacturing	13,530,768	0.73%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
336	Transportation	58,161,687	3.14%	20,547	28,766	28,766	62,669	81,161	19,089	0	3,943	15,631	18,166	5,210	71,584	66,811	42,950
337	Furniture	53,676,682	2.90%	9,280	18,560	18,560	68,670	102,077	7,320	0	12,260	24,337	28,546	732	39,038	46,357	53,677
339	Misc. Manufacturing	48,112,660	2.60%	8,318	16,636	16,636	61,552	91,496	6,561	0	10,989	21,815	25,587	656	34,991	41,552	48,113
Total Industrial kWh Sales		1,851,792,067		1,122,935	855,215	705,278	1,516,307	2,374,225	886,271	286,929	223,172	287,845	739,535	79,903	1,443,335	1,238,329	995,613

Technical Potential Annual kWh Savings by 2015	12,754,892
% of 2015 kWh Sales	0.69%

TABLE C-19: ESTIMATES OF INDUSTRIAL SECTOR KWH SAVINGS BY END USE IN VERMONT BY 2015 - EFFICIENT LAMPS AND FIXTURES AND EFFICIENT LIGHTING DESIGN

				Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other
	Percent Savings by End Use for Agriculture			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	40.00%	0.00%
	Percent Savings by End Use for General Industry			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	80.00%	0.00%
NAICS CODE		Annual Industrial kWh Sales in 2015	Percent of Total														
	Agriculture	140,065,859	7.56%	0	0	0	0	0	0	0	0	0	0	0	0	3,921,844	0
	Mining	12,914,634	0.70%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Construction	38,981,455	2.11%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31-33	<b>Manufacturing</b>	1,659,830,119	89.63%	0	0	0	0	0	0	0	0	0	0	0	0	123,832,865	0
311	Food Manufacturing	219,248,861	11.84%	0	0	0	0	0	0	0	0	0	0	0	0	15,785,918	0
3115	Dairy	118,178,131	6.38%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
321	Wood Products	109,976,839	5.94%	0	0	0	0	0	0	0	0	0	0	0	0	6,158,703	0
322	Paper	276,323,958	14.92%	0	0	0	0	0	0	0	0	0	0	0	0	8,842,367	0
323	Printing	42,960,719	2.32%	0	0	0	0	0	0	0	0	0	0	0	0	9,142,041	0
326	Plastic and Rubber	83,228,627	4.49%	0	0	0	0	0	0	0	0	0	0	0	0	5,093,774	0
327	Mineral Products	125,490,549	6.78%	0	0	0	0	0	0	0	0	0	0	0	0	4,495,184	0
327991	Cut Stone	66,226,354	3.58%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
332	Fabricated metal	118,993,440	6.43%	0	0	0	0	0	0	0	0	0	0	0	0	10,276,706	0
333	Machinery	63,234,461	3.41%	0	0	0	0	0	0	0	0	0	0	0	0	7,742,995	0
334	Computers	358,117,803	19.34%	0	0	0	0	0	0	0	0	0	0	0	0	37,641,579	0
335	Electric Products	36,839,147	1.99%	0	0	0	0	0	0	0	0	0	0	0	0	3,181,563	0
335929	Wire manufacturing	13,530,768	0.73%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
336	Transportation	58,161,687	3.14%	0	0	0	0	0	0	0	0	0	0	0	0	6,681,137	0
337	Furniture	53,676,682	2.90%	0	0	0	0	0	0	0	0	0	0	0	0	4,635,713	0
339	Misc. Manufacturing	48,112,660	2.60%	0	0	0	0	0	0	0	0	0	0	0	0	4,155,184	0
	Total Industrial kWh Sales	1,851,792,067		0	0	0	0	0	0	0	0	0	0	0	0	127,754,709	0

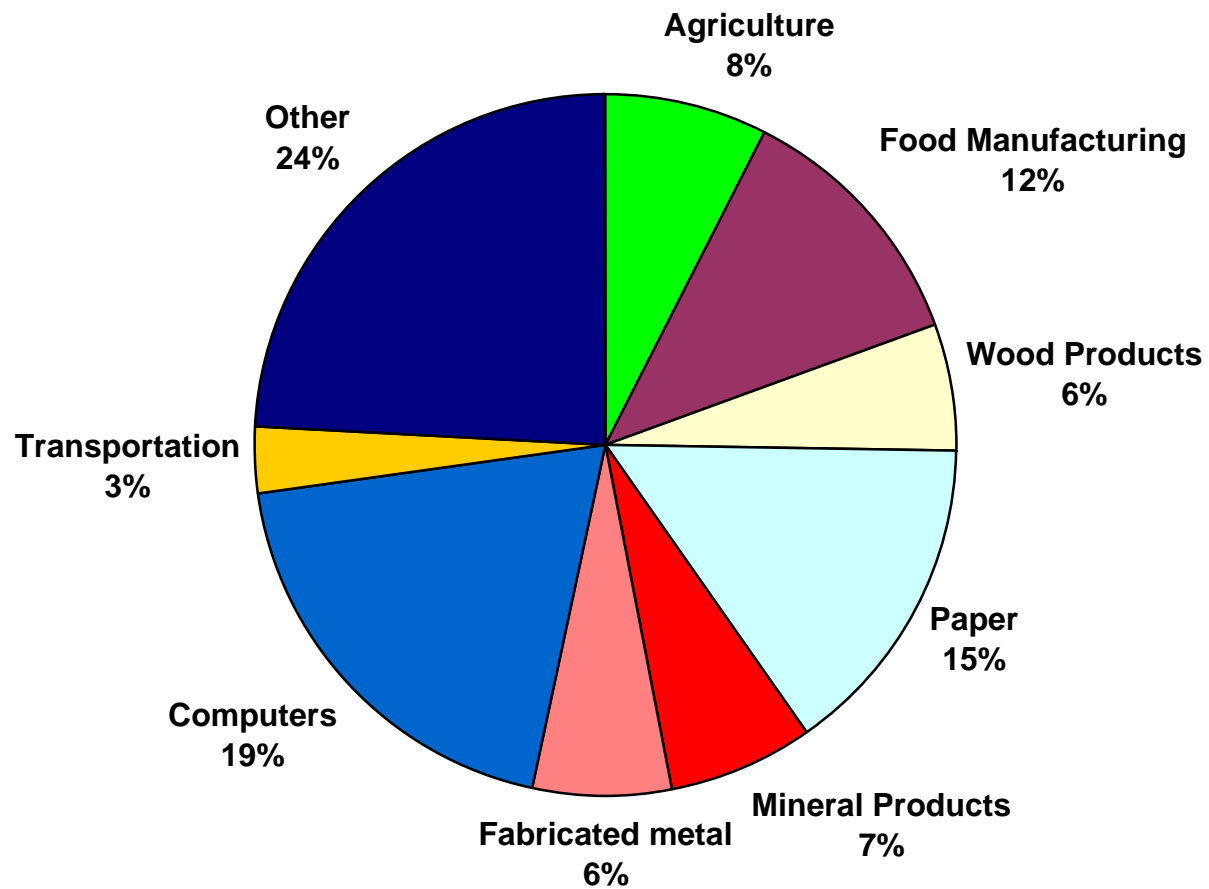
Technical Potential Annual kWh Savings by 2015	127,754,709
% of 2015 kWh Sales	6.90%

4/14/2006 15:49

Technical Potential Annual kWh Savings by 2015	11,011,551
% of 2015 kWh Sales	0.59%

Table C-21: Percent Electricity by End Use for the Agriculture Sector in Vermont																
Motors																
Pumps	Fans and Blowers	Compressed Air	Material Handling	Material Processing	Refrigeration	Total Motors	Other Motors	Drying and Curing	Heat Treating	Heating	Melting and Casting	HVAC	Lighting	Other		
0.0323	0.0209	0.0095			0.0475	0.1235	0.0133			0.0456			0.0133	0.0076	0.19	
17%	11%	5%	0%	0%	25%	65%	7%	0%	0%	24%	0%	0%	7%	4%	1	

**TABLE C-22: Breakdown of Industrial kWh Sales in Vermont**



## **APPENDIX D**

### **Annual MWH and MW Savings**



## **APPENDIX D-1**

### **Cumulative Annual MWH Savings**

**Table D-1**  
**Vermont Electric Energy Efficiency Potential Study**  
**Cumulative Annual MWH Savings**

Appendix D - Maximum Achievable Cost Effective Potential - Cumulative Annual MWH Savings by Year - Based on Screening with Vermont Societal Test State of Vermont													
	VDPS mWh Sales Growth Assumption for Vermont Before DSM Impacts			Residential Energy Efficiency Savings		Commercial Energy Efficiency Savings		Industrial Energy Efficiency Savings		Total Energy Efficiency Savings (mWh)		Vermont Load Forecast Before DSM	Vermont Load Forecast After DSM
Year	Res. Sector mWh Sales	Comm. Sector mWh Sales	Ind. Sector mWh Sales	mWh Savings	% of Projected Res. mWh Sales	mWh Savings	% of Projected Comm. mWh Sales	mWh Savings	% of Projected Ind. mWh Sales	mWh Savings	% of Projected Total kWh Sales	mWh	mWh
2006	2,202,847	1,937,851	1,657,144	56,751	3%	36,318	2%	30,616	2%	123,685	2%	5,840,336	5,716,650
2007	2,249,698	1,956,990	1,677,887	113,502	5%	90,077	5%	59,949	4%	263,528	4%	5,927,941	5,664,413
2008	2,297,488	1,976,268	1,698,846	170,253	7%	152,555	8%	88,463	5%	411,272	7%	6,016,860	5,605,588
2009	2,346,235	1,995,687	1,720,025	227,004	10%	215,033	11%	116,977	7%	559,015	9%	6,107,113	5,548,098
2010	2,395,957	2,015,247	1,741,425	283,756	12%	260,072	13%	145,491	8%	689,318	11%	6,198,720	5,509,401
2011	2,446,672	2,034,947	1,763,047	340,507	14%	305,110	15%	170,179	10%	815,795	13%	6,291,700	5,475,905
2012	2,498,398	2,054,789	1,784,894	397,258	16%	341,428	17%	194,866	11%	933,552	15%	6,386,076	5,452,524
2013	2,551,154	2,074,773	1,806,965	454,009	18%	377,747	18%	219,554	12%	1,051,309	16%	6,481,867	5,430,558
2014	2,604,959	2,094,899	1,829,264	510,760	20%	414,065	20%	244,241	13%	1,169,066	18%	6,579,095	5,410,029
2015	2,659,832	2,115,167	1,851,792	567,511	21%	450,384	21%	268,929	15%	1,286,823	19%	6,677,781	5,390,958

## **APPENDIX D-2**

### **Cumulative Annual Summer and Winter Peak MW Savings**

**Table D-2**  
**Vermont Electric Energy Efficiency Potential Study**  
**Cumulative Annual Summer and Winter Peak MW Savings**

Appendix D - Maximum Achievable Cost Effective Potential - Cumulative Annual Summer and Winter Peak MW Savings - Based on Screening with the Vermont Societal Test														
State of Vermont														
Year	Residential		Commercial		Industrial		Total Savings		Vermont Peak Load Forecast Before DSM		Vermont Peak Load Forecast After EE Programs		Percent Savings	
	Winter Peak MW Savings	Summer Peak MW Savings	Winter Peak MW Savings	Summer Peak MW Savings	Winter Peak MW Savings	Summer Peak MW Savings	Winter Peak MW Savings	Summer Peak MW Savings	Winter Peak Load (MW)	Summer Peak Load (MW)	Winter Peak Load (MW)	Summer Peak Load (MW)	Winter Peak MW Savings	Summer Peak MW Savings
2006	22	10	6	5	9	6	37	21	1,056	979	1,019.2	958.0	3.5%	2.1%
2007	43	20	14	13	19	12	76	44	1,072	993	996.2	949.1	7.1%	4.5%
2008	66	30	23	22	27	18	116	69	1,088	1,008	972.2	938.9	10.6%	6.9%
2009	88	41	31	31	36	23	156	95	1,104	1,023	948.1	928.6	14.1%	9.3%
2010	111	52	38	37	45	29	195	118	1,121	1,039	926.2	920.9	17.4%	11.3%
2011	134	63	45	44	53	33	232	140	1,138	1,054	905.2	914.1	20.4%	13.3%
2012	158	75	50	49	61	38	269	161	1,155	1,070	885.4	908.7	23.3%	15.1%
2013	181	86	56	54	69	43	305	182	1,172	1,086	866.5	903.8	26.1%	16.8%
2014	203	98	62	58	77	47	342	204	1,190	1,103	847.5	898.9	28.8%	18.5%
2015	227	110	68	63	85	52	379	225	1,207	1,119	828.4	893.8	31.4%	20.1%

## **APPENDIX E**

### **Modeling Assumptions**

**APPENDIX E-1**

**Modeling Assumptions**

**Table E-1**  
**Vermont Electric Energy Efficiency Potential Study**  
**Modeling Assumptions**

Inflation Rate:	2.25%			
Discount Rate:	7.98%			
Reserve Margin Assumption:	13.80%			
Energy Line Loss Factors:	Winter On-Peak 1.212	Winter Off-Peak 1.124	Summer On- Peak 1.195	Summer Off- Peak 1.145
Demand Line Lost Factors:	Winter 1.152	Summer 1.152		
Electric Externality Adders:	\$0.0081 per kWh saved			
Fossil Fuel Externality Adders:	Residential Distillate \$ 1.72	Residential Propane \$ 1.31	Residential Natural Gas \$ 1.08	Commercial Distillate \$ 1.72
	Commercial Propane \$ 1.31	Commercial Natural Gas \$ 1.08	Kerosene \$ 1.72	
Emmisions Factors:	SOX: 2.03 lbs/MWH NOX: 0.53 lbs/MWH CO <sub>2</sub> : 1102 lbs/MWH			

## **APPENDIX F**

### **Avoided Costs & Retail Rates**



## **APPENDIX F-1**

### **Electric Avoided Costs**

**Table F-1**  
**Vermont Electric Energy Efficiency Potential Study**  
**Electric Avoided Costs**

Years		Electric Energy - Region - Vermont				Electric Capacity - Region Vermont	
		Seasonal Avoided Energy in Nominal \$				Seasonal Avoided	
		Winter Peak Energy	Winter Off-Peak Energy	Summer Peak Energy	Summer Off-Peak Energy	Summer Generation	Winter Generation
		(¢/kWh)	(¢/kWh)	(¢/kWh)	(¢/kWh)	(\$/kW)	(\$/kW)
1	2005	8.5576	7.2112	8.1787	6.0479	3.6164	0.0000
2	2006	9.8296	8.2013	9.1375	7.0557	37.1674	0.0000
3	2007	10.3045	8.5883	9.6917	7.3476	43.1614	0.0000
4	2008	8.9473	7.2735	8.7129	6.2834	66.9585	0.0000
5	2009	7.6327	6.2052	7.2136	5.2887	73.1956	0.0000
6	2010	6.8399	5.6276	6.4466	4.8366	78.0962	0.0000
7	2011	7.1666	5.9376	6.7272	5.1222	83.3323	0.0000
8	2012	7.5095	6.2658	7.0205	5.4261	88.9259	0.0000
9	2013	7.7429	6.4705	7.2570	5.6020	91.1303	0.0000
10	2014	7.9836	6.6821	7.5016	5.7837	93.5531	0.0000
11	2015	8.2319	6.9006	7.7546	5.9714	96.0403	0.0000
12	2016	8.4879	7.1265	8.0162	6.1653	98.5936	0.0000
13	2017	8.9011	7.5057	8.4826	6.5389	100.1788	0.0000
14	2018	9.3353	7.9063	8.9776	6.9369	101.7894	0.0000
15	2019	9.7914	8.3294	9.5031	7.3609	103.4259	0.0000
16	2020	10.2706	8.7763	10.0609	7.8128	105.0888	0.0000
17	2021	10.6042	9.0542	10.4043	8.0848	107.9468	0.0000
18	2022	10.9487	9.3410	10.7597	8.3665	110.8825	0.0000
19	2023	11.3045	9.6370	11.1274	8.6582	113.8980	0.0000
20	2024	11.6720	9.9425	11.5078	8.9603	116.9956	0.0000
21	2025	12.0516	10.2577	11.9014	9.2731	120.1773	0.0000
22	2026	12.4437	10.5831	12.3086	9.5970	123.4457	0.0000
23	2027	12.8486	10.9190	12.7300	9.9326	126.8029	0.0000
24	2028	13.2669	11.2656	13.1660	10.2800	130.2514	0.0000
25	2029	13.6990	11.6233	13.6171	10.6399	133.7937	0.0000
26	2030	14.1453	11.9926	14.0839	11.0126	137.4323	0.0000
27	2031	14.4579	12.2315	14.4672	11.2254	130.1015	0.0000
28	2032	14.7774	12.4753	14.8610	11.4424	123.1616	0.0000
29	2033	15.1040	12.7239	15.2656	11.6635	116.5920	0.0000
30	2034	15.4377	12.9775	15.6812	11.8890	110.3728	0.0000
31	2035	15.7789	13.2361	16.1081	12.1188	104.4853	0.0000
32	2036	16.1276	13.5000	16.5467	12.3531	98.9119	0.0000
33	2037	16.4840	13.7690	16.9973	12.5919	93.6358	0.0000
34	2038	16.8483	14.0435	17.4602	12.8353	88.6411	0.0000
35	2039	17.2206	14.3235	17.9357	13.0835	83.9129	0.0000
36	2040	17.6080	14.6457	18.3393	13.3779	79.4368	0.0000
37	2041	18.0042	14.9753	18.7519	13.6789	81.2242	0.0000
38	2042	18.4093	15.3122	19.1738	13.9867	83.0517	0.0000
39	2043	18.8235	15.6567	19.6052	14.3014	84.9204	0.0000
40	2044	19.2471	16.0090	20.0463	14.6232	86.8311	0.0000
41	2045	19.6801	16.3692	20.4974	14.9522	88.7848	0.0000
42	2046	20.1229	16.7375	20.9586	15.2886	90.7824	0.0000
43	2047	20.5757	17.1141	21.4301	15.6326	92.8250	0.0000
44	2048	21.0386	17.4992	21.9123	15.9844	94.9136	0.0000

**Table F-1**  
**Vermont Electric Energy Efficiency Potential Study**  
**Electric Avoided Costs**

<u>Years</u>	<b>Electric Energy - Region - Vermont</b>				<b>Electric Capacity - Region Vermont</b>	
	<b>Seasonal Avoided Energy in Nominal \$</b>				<b>Seasonal Avoided</b>	
	Winter Peak Energy	Winter Off-Peak Energy	Summer Peak Energy	Summer Off-Peak Energy	Summer Generation	Winter Generation
	(¢/kWh)	(¢/kWh)	(¢/kWh)	(¢/kWh)	(\$/kW)	(\$/kW)
45 2049	21.5120	17.8929	22.4053	16.3440	97.0492	0.0000
46 2050	21.9960	18.2955	22.9095	16.7117	99.2328	0.0000
47 2051	22.4909	18.7072	23.4249	17.0878	101.4655	0.0000
48 2052	22.9970	19.1281	23.9520	17.4722	103.7485	0.0000
49 2053	23.5144	19.5584	24.4909	17.8654	106.0828	0.0000
50 2054	24.0435	19.9985	25.0420	18.2673	108.4697	0.0000
51 2055	24.5845	20.4485	25.6054	18.6783	110.9102	0.0000
52 2056	25.1376	20.9086	26.1815	19.0986	113.4057	0.0000
53 2057	25.7032	21.3790	26.7706	19.5283	115.9574	0.0000
54 2058	26.2815	21.8600	27.3729	19.9677	118.5664	0.0000
55 2059	26.8729	22.3519	27.9888	20.4170	121.2341	0.0000
56 2060	27.4775	22.8548	28.6186	20.8764	123.9619	0.0000
57 2061	28.0958	23.3690	29.2625	21.3461	126.7510	0.0000
58 2062	28.7279	23.8948	29.9209	21.8264	129.6029	0.0000
59 2063	29.3743	24.4325	30.5941	22.3175	132.5190	0.0000
60 2064	30.0352	24.9822	31.2825	22.8196	135.5007	0.0000
61 2065	30.7110	25.5443	31.9863	23.3330	138.5495	0.0000

## **APPENDIX F-2**

### **Gas Avoided Costs**

**Table F-2**  
**Vermont Electric Energy Efficiency Potential Study**  
**Gas Avoided Costs**

Years		Natural Gas in Nominal \$ - Region Vermont						
		Commerical & Industrial			Residential			
		Non-Heating	Heating	All	Heating Retrofit	New Heating	Hot Water	All
		(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)
1	2005	11.3708	11.3705	11.3707	12.4793	12.4035	12.4038	12.4290
2	2006	12.1158	12.0922	12.1040	13.2267	13.1484	13.1721	13.1824
3	2007	12.0340	11.9385	11.9863	13.0942	13.0185	13.1141	13.0754
4	2008	10.2037	10.1836	10.1936	11.3610	11.2879	11.3080	11.3190
5	2009	9.3719	9.3980	9.3849	10.6000	10.5271	10.5010	10.5429
6	2010	8.7558	8.8378	8.7968	10.0664	9.9924	9.9104	9.9901
7	2011	9.0226	9.1069	9.0647	10.3633	10.2874	10.2031	10.2850
8	2012	9.4646	9.5521	9.5084	10.8378	10.7592	10.6717	10.7566
9	2013	9.9066	9.9974	9.9520	11.3128	11.2317	11.1408	11.2289
10	2014	10.8182	10.9149	10.8665	12.2626	12.1769	12.0802	12.1737
11	2015	10.5596	10.6556	10.6076	12.0317	11.9461	11.8500	11.9431
12	2016	10.8257	10.9241	10.8749	12.3313	12.2436	12.1451	12.2405
13	2017	11.0335	11.1339	11.0837	12.5726	12.4830	12.3826	12.4799
14	2018	11.4779	11.5817	11.5298	13.0535	12.9612	12.8574	12.9579
15	2019	11.9828	12.0903	12.0365	13.5962	13.5008	13.3933	13.4973
16	2020	12.4329	12.5439	12.4884	14.0843	13.9861	13.8752	13.9824
17	2021	13.1321	13.2479	13.1900	14.8247	14.7227	14.6068	14.7186
18	2022	13.5604	13.6796	13.6200	15.2923	15.1875	15.0683	15.1833
19	2023	14.3906	14.5154	14.4530	16.1665	16.0572	15.9324	16.0527
20	2024	14.8572	14.9857	14.9215	16.6745	16.5622	16.4338	16.5574
21	2025	15.9319	16.0674	15.9997	17.7971	17.6795	17.5439	17.6741
22	2026	16.2904	16.4290	16.3597	18.1975	18.0772	17.9387	18.0718
23	2027	16.6569	16.7986	16.7278	18.6070	18.4840	18.3423	18.4784
24	2028	17.0317	17.1766	17.1042	19.0256	18.8999	18.7550	18.8942
25	2029	17.4149	17.5631	17.4890	19.4537	19.3251	19.1770	19.3193
26	2030	17.8068	17.9582	17.8825	19.8914	19.7599	19.6085	19.7540
27	2031	18.2074	18.3623	18.2849	20.3390	20.2045	20.0497	20.1985
28	2032	18.6171	18.7754	18.6963	20.7966	20.6591	20.5008	20.6529
29	2033	19.0360	19.1979	19.1169	21.2645	21.1240	20.9621	21.1176
30	2034	19.4643	19.6298	19.5471	21.7430	21.5993	21.4337	21.5928
31	2035	19.9022	20.0715	19.9869	22.2322	22.0852	21.9160	22.0786
32	2036	20.3500	20.5231	20.4366	22.7324	22.5822	22.4091	22.5754
33	2037	20.8079	20.9849	20.8964	23.2439	23.0902	22.9133	23.0833
34	2038	21.2761	21.4570	21.3666	23.7669	23.6098	23.4288	23.6027
35	2039	21.7548	21.9398	21.8473	24.3017	24.1410	23.9560	24.1338
36	2040	22.2443	22.4335	22.3389	24.8484	24.6842	24.4950	24.6768
37	2041	22.7448	22.9382	22.8415	25.4075	25.2396	25.0461	25.2320
38	2042	23.2565	23.4543	23.3554	25.9792	25.8075	25.6096	25.7997
39	2043	23.7798	23.9821	23.8809	26.5637	26.3881	26.1859	26.3802
40	2044	24.3149	24.5217	24.4183	27.1614	26.9819	26.7750	26.9738
41	2045	24.8619	25.0734	24.9677	27.7725	27.5889	27.3775	27.5807
42	2046	25.4213	25.6376	25.5294	28.3974	28.2097	27.9935	28.2012
43	2047	25.9933	26.2144	26.1039	29.0364	28.8444	28.6233	28.8358
44	2048	26.5782	26.8042	26.6912	29.6897	29.4934	29.2674	29.4846
45	2049	27.1762	27.4073	27.2917	30.3577	30.1570	29.9259	30.1480

**Table F-2**  
**Vermont Electric Energy Efficiency Potential Study**  
**Gas Avoided Costs**

Years		Natural Gas in Nominal \$ - Region Vermont						
		Commerical & Industrial			Residential			
		Non-Heating	Heating	All	Heating Retrofit	New Heating	Hot Water	All
		(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)
46	2050	27.7876	28.0240	27.9058	31.0408	30.8356	30.5992	30.8263
47	2051	28.4129	28.6545	28.5337	31.7392	31.5294	31.2877	31.5199
48	2052	29.0521	29.2992	29.1757	32.4533	32.2388	31.9917	32.2291
49	2053	29.7058	29.9585	29.8321	33.1835	32.9641	32.7115	32.9542
50	2054	30.3742	30.6325	30.5034	33.9301	33.7058	33.4475	33.6957
51	2055	31.0576	31.3218	31.1897	34.6936	34.4642	34.2000	34.4539
52	2056	31.7564	32.0265	31.8915	35.4742	35.2397	34.9696	35.2291
53	2057	32.4709	32.7471	32.6090	36.2723	36.0325	35.7564	36.0217
54	2058	33.2015	33.4839	33.3427	37.0885	36.8433	36.5609	36.8322
55	2059	33.9486	34.2373	34.0929	37.9229	37.6723	37.3835	37.6609
56	2060	34.7124	35.0077	34.8600	38.7762	38.5199	38.2246	38.5083
57	2061	35.4934	35.7953	35.6444	39.6487	39.3866	39.0847	39.3748
58	2062	36.2920	36.6007	36.4464	40.5408	40.2728	39.9641	40.2607
59	2063	37.1086	37.4242	37.2664	41.4529	41.1789	40.8633	41.1666
60	2064	37.9436	38.2663	38.1049	42.3856	42.1054	41.7827	42.0928
61	2065	38.7973	39.1273	38.9623	43.3393	43.0528	42.7228	43.0399

## **APPENDIX F-3**

### **Retail Rates**

**Table F-3**  
**Vermont Electric Energy Efficiency Potential Study**  
**Retail Rates**

Years	Electric Retail Rate				Central New England Forecast by Sector and Fuel					Other in Nominal \$ Central New England Forecast by Sector					
	Retail Rate				Fuel Oil in Nominal \$					Propane in Nominal \$			Wood in Nominal \$		Other
	Residential	Commercial	Industrial	All	Res. Distillate	Com. #2 Oil	Com. #4 Oil	Ind. #6 Oil	Kerosene	Residential	Commercial	Industrial	Greenwood	Seasoned	Water
	(¢/kWh)	(¢/kWh)	(¢/kWh)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBTU)	(\$/MMBTU)	(\$/gallon)
1 2005	13.0600	11.3500	8.0800	11.9528	14.0512	12.0230	11.0927	9.5213	14.0373	20.5518	16.5942	14.6046	8.04	10.54	0.0114
2 2006	13.0017	11.2994	8.0439	12.6971	14.5201	12.4463	11.4951	9.8883	14.3081	21.1671	17.1204	15.0860	8.39	10.99	0.0114
3 2007	13.5226	11.7520	8.3662	12.5853	14.4748	12.3543	11.3817	9.7388	14.2580	21.2713	17.1335	15.0534	8.75	11.47	0.0117
4 2008	13.7886	11.9832	8.5308	10.8126	14.6103	12.4421	11.4476	9.7677	14.3886	21.5597	17.3288	15.2019	9.13	11.96	0.0120
5 2009	13.8035	11.9962	8.5400	10.0218	15.1578	12.9408	11.9239	10.2063	14.9311	22.2636	17.9375	15.7627	9.52	12.47	0.0122
6 2010	14.1003	12.2541	8.7236	9.4531	16.0209	13.7540	12.7142	10.9579	15.7891	23.2865	18.8631	16.6394	9.93	13.01	0.0125
7 2011	14.3373	12.4600	8.8702	9.7359	16.0408	13.7229	12.6597	10.8639	15.8037	23.4699	18.9470	16.6732	10.35	13.57	0.0128
8 2012	15.3064	13.3023	9.4698	10.1949	16.0618	13.6917	12.6046	10.7684	15.8194	23.6580	19.0333	16.7084	10.80	14.15	0.0131
9 2013	15.5136	13.4823	9.5980	10.6543	16.0755	13.6521	12.5406	10.6630	15.8277	23.8427	19.1139	16.7367	11.26	14.76	0.0134
10 2014	15.8287	13.7562	9.7930	11.5855	16.0816	13.6037	12.4672	10.5474	15.8282	24.0236	19.1884	16.7577	11.75	15.39	0.0137
11 2015	16.1845	14.0654	10.0131	11.3421	16.0583	13.5246	12.3625	10.3995	15.7992	24.1789	19.2350	16.7496	12.25	16.05	0.0140
12 2016	16.7048	14.5176	10.3350	11.6260	16.4800	13.8893	12.7010	10.6939	16.2151	24.7834	19.7282	17.1869	12.78	16.74	0.0143
13 2017	17.2610	15.0009	10.6791	11.8516	17.0100	14.3610	13.1460	11.0937	16.7391	25.5002	20.3313	17.7327	13.32	17.46	0.0146
14 2018	17.8057	15.4743	11.0161	12.3152	17.5554	14.8468	13.6045	11.5060	17.2784	26.2366	20.9514	18.2944	13.90	18.21	0.0149
15 2019	18.3902	15.9823	11.3777	12.8400	18.1167	15.3472	14.0769	11.9312	17.8335	26.9933	21.5891	18.8724	14.49	18.99	0.0153
16 2020	19.0176	16.5275	11.7659	13.3101	18.6943	15.8625	14.5636	12.3696	18.4047	27.7706	22.2449	19.4670	15.12	19.81	0.0156
17 2021	19.5101	16.9556	12.0706	14.0307	19.2887	16.3932	15.0651	12.8217	18.9926	28.5692	22.9191	20.0788	15.77	20.66	0.0160
18 2022	20.0142	17.3936	12.3824	14.4798	19.9003	16.9396	15.5816	13.2878	19.5976	29.3896	23.6124	20.7081	16.44	21.55	0.0163
19 2023	20.5332	17.8447	12.7035	15.3328	20.5296	17.5023	16.1138	13.7683	20.2200	30.2324	24.3253	21.3556	17.15	22.47	0.0167
20 2024	21.0676	18.3092	13.0342	15.8212	21.1771	18.0817	16.6619	14.2637	20.8605	31.0982	31.0982	22.0217	17.89	23.44	0.0171
21 2025	21.6180	18.7875	13.3747	16.9206	21.8432	18.6782	17.2264	14.7743	21.5196	31.9876	31.9876	22.7068	18.65	24.44	0.0175
22 2026	22.2529	19.3393	13.7675	17.3014	22.3347	19.0984	17.6140	15.1067	22.0038	32.7073	26.3924	23.2177	19.07	24.99	0.0179
23 2027	22.9065	19.9073	14.1719	17.6906	22.8372	19.5282	18.0103	15.4466	22.4988	33.4432	26.9862	23.7401	19.50	25.56	0.0183
24 2028	23.5793	20.4919	14.5881	18.0887	23.3511	19.9675	18.4156	15.7941	23.0051	34.1957	27.5934	24.2743	19.94	26.13	0.0187
25 2029	24.2718	21.0938	15.0166	18.4957	23.8765	20.4168	18.8299	16.1495	23.5227	34.9651	28.2142	24.8204	20.39	26.72	0.0191
26 2030	24.9847	21.7133	15.4576	18.9118	24.4137	20.8762	19.2536	16.5129	24.0519	35.7518	28.8491	25.3789	20.85	27.32	0.0195
27 2031	25.7185	22.3510	15.9116	19.3373	24.9630	21.3459	19.6868	16.8844	24.5931	36.5562	29.4982	25.9499	21.32	27.94	0.0200
28 2032	26.4738	23.0075	16.3789	19.7724	25.5247	21.8262	20.1298	17.2643	25.1465	37.3787	30.1619	26.5338	21.80	28.56	0.0204
29 2033	27.2513	23.6832	16.8599	20.2173	26.0990	22.3173	20.5827	17.6528	25.7123	38.2197	30.8405	27.1308	22.29	29.21	0.0209
30 2034	28.0517	24.3788	17.3551	20.6722	26.6862	22.8194	21.0458	18.0500	26.2908	39.0797	31.5344	27.7413	22.79	29.86	0.0213
31 2035	28.8756	25.0948	17.8648	21.1373	27.2867	23.3328	21.5193	18.4561	26.8823	39.9590	32.2439	28.3654	23.30	30.54	0.0218
32 2036	29.7237	25.8318	18.3895	21.6129	27.9006	23.8578	22.0035	18.8713	27.4872	40.8581	32.9694	29.0037	23.83	31.22	0.0223
33 2037	30.5967	26.5905	18.9296	22.0992	28.5284	24.3946	22.4986	19.2959	28.1056	41.7774	33.7112	29.6562	24.36	31.93	0.0228
34 2038	31.4953	27.3715	19.4856	22.5964	29.1703	24.9435	23.0048	19.7301	28.7380	42.7174	34.4697	30.3235	24.91	32.64	0.0233
35 2039	32.4203	28.1754	20.0579	23.1049	29.8266	25.5047	23.5224	20.1740	29.3846	43.6785	35.2453	31.0058	25.47	33.38	0.0238
36 2040	33.3725	29.0029	20.6470	23.6247	30.4977	26.0786	24.0517	20.6279	30.0458	44.6613	36.0383	31.7034	26.04	34.13	0.0244
37 2041	34.3526	29.8547	21.2534	24.1563	31.1839	26.6654	24.5928	21.0921	30.7218	45.6661	36.8492	32.4167	26.63	34.90	0.0249
38 2042	35.3616	30.7315	21.8776	24.6998	31.8855	27.2653	25.1462	21.5666	31.4130	46.6936	37.6783	33.1461	27.23	35.68	0.0255
39 2043	36.4001	31.6341	22.5201	25.2555	32.6029	27.8788	25.7120	22.0519	32.1198	47.7442	38.5261	33.8919	27.84	36.49	0.0261
40 2044	37.4692	32.5632	23.1816	25.8238	33.3365	28.5061	26.2905	22.5481	32.8425	48.8185	39.3929	34.6545	28.47	37.31	0.0266
41 2045	38.5697	33.5196	23.8624	26.4048	34.0866	29.1475	26.8820	23.0554	33.5815	49.9169	40.2792	35.4342	29.11	38.15	0.0272
42 2046	39.7025	34.5041	24.5632	26.9989	34.8535	29.8033	27.4869	23.5741	34.3371	51.0400	41.1855	36.2315	29.76	39.00	0.0279
43 2047	40.8685	35.5175	25.2847	27.6064	35.6377	30.4739	28.1053	24.1046	35.1097	52.1884	42.1122	37.0467	30.43	39.88	0.0285
44 2048	42.0688	36.5606	26.0273	28.2275	36.4396	31.1595	28.7377	24.6469	35.8996	53.3627	43.0597	37.8802	31.12	40.78	0.0291



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**Vermont Electric Energy Efficiency Potential Study**  
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Years	Electric Retail Rate				Central New England Forecast by Sector and Fuel					Other in Nominal \$ Central New England Forecast by Sector					
	Retail Rate				Fuel Oil in Nominal \$					Propane in Nominal \$			Wood in Nominal \$		Other
	Residential	Commercial	Industrial	All	Res. Distillate	Com. #2 Oil	Com. #4 Oil	Ind. #6 Oil	Kerosene	Residential	Commercial	Industrial	Greenwood	Seasoned	Water
	(¢/kWh)	(¢/kWh)	(¢/kWh)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBtu)	(\$/MMBTU)	(\$/MMBTU)	(\$/gallon)
45 2049	43.3044	37.6344	26.7917	28.8627	37.2595	31.8606	29.3843	25.2015	36.7074	54.5633	44.0286	38.7325	31.82	41.70	0.0298
46 2050	44.5763	38.7397	27.5786	29.5121	38.0978	32.5775	30.0454	25.7685	37.5333	55.7910	45.0192	39.6040	32.53	42.63	0.0305
47 2051	45.8855	39.8775	28.3886	30.1761	38.9550	33.3105	30.7215	26.3483	38.3778	57.0463	46.0321	40.4951	33.27	43.59	0.0311
48 2052	47.2331	41.0487	29.2223	30.8551	39.8315	34.0600	31.4127	26.9411	39.2413	58.3298	47.0679	41.4062	34.01	44.57	0.0318
49 2053	48.6204	42.2543	30.0806	31.5493	40.7277	34.8263	32.1195	27.5473	40.1242	59.6423	48.1269	42.3379	34.78	45.58	0.0326
50 2054	50.0483	43.4953	30.9641	32.2592	41.6441	35.6099	32.8422	28.1671	41.0270	60.9842	49.2097	43.2905	35.56	46.60	0.0333
51 2055	51.5183	44.7728	31.8735	32.9850	42.5811	36.4111	33.5811	28.8009	41.9501	62.3564	50.3170	44.2645	36.36	47.65	0.0340
52 2056	53.0313	46.0877	32.8096	33.7272	43.5392	37.2304	34.3367	29.4489	42.8940	63.7594	51.4491	45.2605	37.18	48.72	0.0348
53 2057	54.5889	47.4413	33.7732	34.4860	44.5188	38.0680	35.1093	30.1115	43.8591	65.1940	52.6067	46.2788	38.02	49.82	0.0356
54 2058	56.1922	48.8347	34.7651	35.2619	45.5205	38.9246	35.8992	30.7890	44.8459	66.6608	53.7904	47.3201	38.87	50.94	0.0364
55 2059	57.8425	50.2690	35.7862	36.0553	46.5447	39.8004	36.7069	31.4818	45.8550	68.1607	55.0006	48.3848	39.75	52.09	0.0372
56 2060	59.5414	51.7454	36.8372	36.8666	47.5919	40.6959	37.5329	32.1901	46.8867	69.6943	56.2382	49.4735	40.64	53.26	0.0380
57 2061	61.2901	53.2651	37.9191	37.6961	48.6627	41.6115	38.3773	32.9144	47.9417	71.2624	57.5035	50.5866	41.56	54.46	0.0389
58 2062	63.0902	54.8295	39.0328	38.5442	49.7576	42.5478	39.2408	33.6550	49.0203	72.8658	58.7973	51.7248	42.49	55.68	0.0398
59 2063	64.9431	56.4399	40.1792	39.4115	50.8772	43.5051	40.1238	34.4122	50.1233	74.5053	60.1203	52.8886	43.45	56.94	0.0407
60 2064	66.8505	58.0975	41.3593	40.2983	52.0219	44.4840	41.0265	35.1865	51.2511	76.1817	61.4730	54.0786	44.43	58.22	0.0416
61 2065	68.8139	59.8038	42.5740	41.2050	53.1924	45.4849	41.9496	35.9782	52.4042	77.8958	62.8561	55.2954	45.42	59.53	0.0425